Our Palace Wonderful

By the
Rev. Frederick A. Houck

215
H83
H S

Houck, F. A.

Our Palace Wonderful

ST. BEDE COLLEGE LIBRARY

RULES

1. Reference books, magazines, and newspapers are to be used only in the library.

2. Reserved books may be borrowed at the close of school, but they must be returned promptly before the first class the following school day. Failure to return reserved books will result in a fine of 25 cents an hour until they are returned.

3. All other books may be kept two weeks and be renewed once for the same period, except 7-day books.

4. A fine of 2 cents a day is charged for each book kept overtime. Delay or failure to pay a fine results in automatic loss of all privileges in the library.

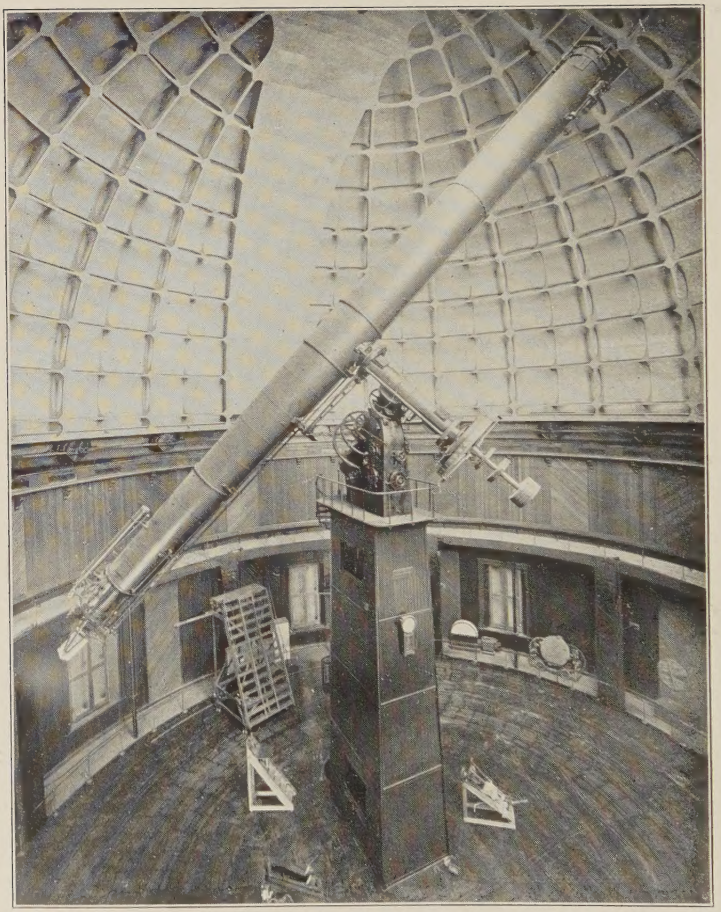
5. All injuries to books beyond reasonable wear and all losses shall be made good to the satisfaction of the librarian.

Tue
Feb 23



Digitized by the Internet Archive
in 2022 with funding from
Kahle/Austin Foundation

https://archive.org/details/ourpalacewonderf0000houc_i8i7



Refracting Telescope (36 Ins.)—In Lick Observatory, Mt. Hamilton, Cal.

OUR PALACE WONDERFUL

OR

Man's Place in Visible Creation

BY THE

REV. FREDERICK A. HOUCK

Author of "LIFE OF ST. GERLACH"

"Thou art, O God, the life and light
Of all this wondrous world we see;
Its glow by day, its smile by night,
Are but reflections caught from Thee."
—MOORE.

First Edition, Jan. 1st, 1915.
Second Edition, July 1st, 1915.
Third Edition, Oct. 1st, 1915.
Fourth Edition, Dec. 1st, 1915.

D. B. HANSEN & SONS
PUBLISHERS
CHICAGO, ILLINOIS
1915

Nihil Obstat:=

RAPHAEL KINNANE, D. D.,
Censor Librorum

Imprimatur:=

✠ JOSEPHUS SCHREMBS,
Episcopus Toletanus
in America

Entered According to Act of Congress in the Year 1914
By REV. FREDERICK A. HOUCK
In the Office of the Librarian of Congress, at
Washington, D. C.

(All Rights Reserved)

HAMMOND PRESS
W. B. CONKEY COMPANY
CHICAGO

L 15
H 83
H S

THIS BOOK IS AFFECTIONATELY

Dedicated

TO MY BELOVED PARENTS,
ESTEEMED TEACHERS,
AND ALL OTHER
BENEFACTORS

TABLE OF CONTENTS

CHAPTER.		PAGE
	INTRODUCTION	11
I.	REFUTATION OF ERRONEOUS THEORIES ON THE ORIGIN OF OUR PALACE WONDERFUL	17–32
	1. The Agnostic Theory	21
	2. The Materialistic Theory	24
	3. The Pantheistic Theory	29
II.	THE MINERAL KINGDOM POSTULATES A CREATOR	33–84
	1. Proofs Furnished by Science and Revelation	33
	2. Proofs Taken From the Sidereal World	40
	3. Arguments Deduced From the Mechanism, Harmony, and General Plan of the Visible Universe	55
	4. Speculations	73
	5. Catholic Astronomers	77
III.	THE VEGETABLE KINGDOM REFLECTS THE WISDOM OF THE CREATOR	85
	1. Preliminary Remarks	85
	2. General Morphology of Plants	87
	A. The Stem	90
	B. The Leaf	91
	C. The Flower	93
	3. The Preservation and Propagation of Plants	98

CHAPTER. PAGE

4. The Constituent Simplicity and Amazing Variety of the Vegetable Kingdom..... 107

5. The Use and Misuse of Plants 108

A. The Use of Plants 108

B. The Misuse of Plants and Forest Conservation 112

C. Coal 118

6. Botany and Religion 123

IV. Man, The Sovereign Tenant of the Palace Wonderful, is the Sole Conscious Beneficiary of the Creator's Goodness and Magnanimity 130

1. Man is Made to the Image and Likeness of the Creator 133

2. The Object of the Creator's Loving Solicitude in this World, Man is Destined for Eternal Happiness in the Next World... 140

V. The Study of Visible Creation Begets the Love of Man, as Well as the Love of God 155

Conclusion 169

VI. Index.

LIST OF ILLUSTRATIONS

PAGE

THIRTY-SIX INCH REFRACTING TELESCOPE AT LICK OBSERVATORY ..... FRONTISPIECE

THE GALAXY, OR MILKY WAY 11

PLATE I, MAP OF THE STARS 21

THE SUN 34

PLATE II, THE SOLAR SYSTEM 44

THE PLANET SATURN 54

PLATE III, COMETS 70

OAK TREE *(Quercus Virginiana)* 85

CHRYSANTHEMUMS 95

COTTON 111

THE PASSION FLOWER 123

TRILLIA 133

THE LA FRANCE ROSE 155

SCENIC 169



The Galaxy, or Milky Way.

INTRODUCTION

PERHAPS there is no natural pursuit of the mind so well adapted to afford us joy and delight as an intelligent study of this earth of ours,—our common home. Its various compartments are only partially known, and yet they reveal a striking symmetry and beauty. The more we learn of Nature, the more we are prompted to give glory to Nature's God.

"If one train of thinking," says Paley, "be more desirable than another, it is that which regards the phenomena of Nature with a constant reference to a Supreme Intelligent Being." Some of the keenest intellects have found extreme delight in the pursuit of the natural sciences. Thus, in the Confessions of St. Augustine we read: "The contemplation of God in His creatures gives me great delight, and as often as I can find leisure from other necessary duties I repair to this pleasure."—cf. chap. XL.

Everyone, even the poorest of the poor, can, if he will, find joy and recreation in the contemplation of our grand and common palace. Should the contemplation of this rough sketch impart to the reader some of that delight which I daily experience when dwelling on the grandeur of our palatial home, I shall consider myself amply repaid.

It was not, however, without a certain misgiving that I set about the task of conveying an idea of the material universe as the temporal home of man. Realizing my own limited ability I could, at best, hope to give but a very imperfect description of the immense palace in which we dwell. And does not Holy Writ say that "It is impossible to find out the glorious works of God"? Eccl. 18:5. He who acquires even an imperfect conception of the world as a complete entirety created for the temporal home of man, will find therein a never-failing source of hope and consolation. Let this be my apology, if there be need of any, for publishing truths with which the average reader is already familiar. The material I have used has been given to the world by learned and self-sacrificing scientists of ancient and modern times, but it is contained in books scarcely available. All praise to them for their disinterested researches, and all glory to God, who has thus deigned to manifest His boundless goodness and generosity towards us His children.

I invite the reader, then, to accompany me on a journey in mind and spirit through our palatial home. I do not promise a comprehensive knowledge of either the entire palace, or even the most obscure corner thereof. But I make bold to say that the reader will lay this book aside with increased wonder at the temporal abode prepared for us by a loving and boun-

teous hand. And who will deny, that wonder is the mother of knowledge, and a fountain of true and genuine joy and delight? How many a misguided reader, impelled by a false kind of wonder, takes up the wild and unreal production of a writer of fiction and wastes his time on it only to lay the insipid book aside with disgust, or dissatisfaction.

Man is the maker of fiction, and, hence, it cannot satiate nor satisfy. God is the source of truth, which can be discovered, but not made. In this unpretentious little work we will try to find and to appreciate the wonders and the beauties of the material universe as the temporal abode of man.

The form in which I present these facts and theories, which are a perennial source of faith, hope and charity to me, is, perhaps, the only apology I can offer the public for publishing what is already known.

> "Since all things have been said by men of sense,
> The only novelty is—to condense."
>
> —*Focas.*

Fearing lest this little volume become too bulky for the purpose intended, and viewing man as the acme and king of animate creation, I shall treat the animal kingdom only in general.

In making this simple sketch I will avail myself of the material furnished by scientists and philosophers. For the ornaments and dec-

orations I will draw on theology and revelation. Should the result be of interest and instruction let honor and glory be given to the Heavenly Father from whom every best gift cometh.

The aim of this little treatise is rather to confirm the believer than to convert the unbeliever. Throughout, I endeavor to present "the argument of design" in a manner that will not only instruct but, likewise, please. It takes more than reason and argument to convince those who stubbornly refuse to admit the existence of God. For such I have only pity. I request them, however, to read these pages with an unbiased mind. Should they do so, I am sure that they will find their present attitude towards Revelation untenable. To the man of faith the examples of formal order presented in this little work will be a source of moral strength and livelier faith. As Sir R. H. Inglis well says: "Every advance in our knowledge of the natural world will, if rightly directed by the spirit of true humility, and with a prayer for God's blessing, advance us in our knowledge of God himself, and will prepare us to receive the revelation of His Will with profounder reverence." "All things were made by Him; and without Him was made nothing that was made."—John 1:3. "Disce," ait S. Augustinus, "amare in creatura Creatorem, in factura Factorem." Learn to love the Creator in the creature, and the

Maker in His work. I invite all, then, to quench their thirst for the true and the beautiful in nature at the perennial spring of science.

"Nature is the glass reflecting God
As by the sea reflected is the sun."
—*Young.*

CHAPTER I

REFUTATION OF ERRONEOUS THEORIES ON THE ORIGIN OF OUR PALACE WONDERFUL

A TEACHER of morality in the United States gave utterance some years ago to the following wail: "We can only grope toward the light while we guess at truth. Creation is one conglomerate conjecture. No answer comes when we call out to the cosmos. We look upon the earth, and it speaks only with silence. We look above, and the sky has the pitiless seeming of the changeless sphinx. We call again, and not even an echo is vouchsafed us from the voiceless voids. The surges of the sea murmur ever of a mystery too mighty for finite expression. The very winds whisper to us secrets with never a solution. The unanswerable questions of 'what?' and 'why?' linger eternally on our lips."—Walter Hurt in "The Gatling Gun." cf. "The Catholic Fortnightly Review," June 8, 1899.

Such are the gloomy reflections and pitiable sentiments of many a misguided creature who is, nevertheless, ready to acknowledge and extol the reasoning powers of man, and the results of scientific research. And yet, should we have no other source of obtaining a knowledge of the

Creator, an intelligent and unbiased study of Nature, in any one of its branches, would easily lead man to the certain knowledge of an Omnipotent and All-wise God. For the material world, if rightly viewed, is a commentary on God's Revealed Word. The more closely we examine the former, the clearer becomes our insight into the latter. The natural sciences, when rightly pursued, shall ever prove themselves the handmaid of Divine Revelation.

But what about those questions on which science and Revelation, at least apparently, seem to disagree? I answer, that there can be no *lasting* opposition between science and Revelation, for the simple reason that Almighty God is the author of both. I speak, here, of science in the strict sense of the term, not of a "science falsely so called, which, some professing, have erred concerning the faith." I Tim. 6:20 and 21. The man who is actuated in his researches by a stubborn insubordination to everything that argues design in the material universe, may, perhaps, acquire great erudition, but his knowledge will never be a scientific knowledge; it will be of the kind "that puffeth up," II Cor. 8:2, and blinds the man who permits himself to be biased by it. Although "professing himself to be wise," he who acts thus "becomes a fool," Rom. 1:22; for, "the fool hath said in his heart: There is no God." Ps. 13:1. Such a man makes himself the center of creation, and vainly ex-

pects all else to revolve about him. Is it a wonder that he sees naught but disorder and confusion?

True science and Revelation cannot be at variance; for, true science, as well as Revelation, is based on the truth. In applying the laws of physical science, however, as a commentary on Divine Revelation, we must ever suspect our private judgment. If we cannot discover harmony between the Revealed Word of God and its commentary,—visible creation,—we may be sure that we have blundered in reading the one, or the other, or perhaps in the reading of both. The two, if rightly interpreted, must agree. And when we discover that they seemingly do not agree, we must prefer Revelation as interpreted by the living and infallible teaching body of God's Church. If, as is sometimes the case, this divinely instituted authority has not declared the sense of some text which seems to contradict the results of scientific research, we must suspend our judgment till more light be revealed by the Author of both. For, as Mr. Balfour* so well remarks: "The contemplation of the various works of God in creation should be made subservient to the advancement of the kingdom of grace; they should be studied in the light of God's Revealed Word, and thus be made to promote His glory and our everlasting happiness."

* "Botany and Religion."—p. 26.

He who pursues the study of Nature in this spirit will find that there is no earthly thing so mean, but it is fitted to teach us some higher, some heavenly, truth. This is the primary end of all created things. All the visible things of this world should elevate our minds from the finite to the Infinite,—from time to eternity,—from the creature to the Creator. This is their immediate end as manifested by right reason and by Revelation. Both our unaided reason as well as the Revealed Word of God teach us that man can attain to a knowledge of an All-wise and Omnipotent Creator solely from the contemplation of the visible universe. "For the invisible things of God, from the creation of the world, are clearly seen, being understood by the things that are made."—Rom. 1:19.

Among the many branches of science, which furnish us with irrefutable arguments in favor of the Theist view of creation, I will limit myself chiefly to the two most fascinating of the natural sciences,—astronomy and botany.

Perhaps no department of knowledge, barring Revelation, furnishes clearer and more certain proofs for the existence of an All-wise and Omnipotent Creator than the science of astronomy:

"For the bright firmament
Shoots forth no flame
So silent, but is eloquent
In speaking the Creator's name."

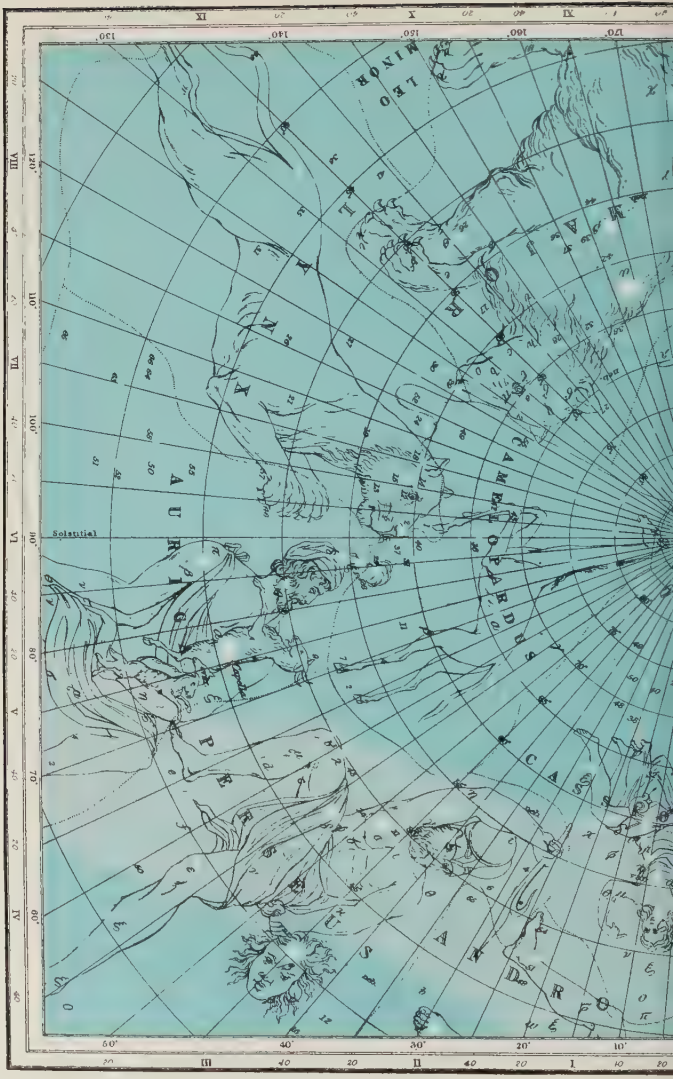
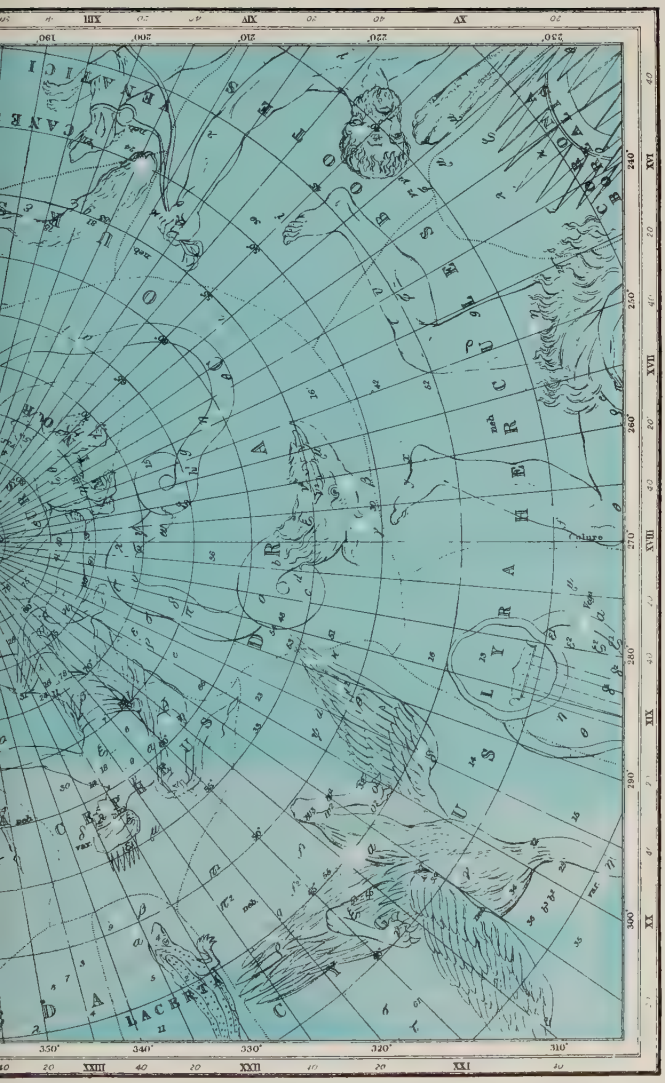


PLATE I.—Map of th


LYRA
HERCULES
CYGNUS
DRACO
CEPHEUS
CASSIOPEIA
PERSEUS
AURIGA
LACERTA
CAMELOPARDALIS
URSA MAJOR
BOOTES
CORONA BOREALIS
CANES VENATICI
CAMELOPARDALIS
Vega
Deneb
Altair
Capella
Arcturus
Polaris
Alkaid
Dubhe
Merak
Phecda
Megrez
Alioth
Mizar
Benetnasch
Kochab
Pherkad
Rastaban
Eltanin
Etamin
Alderamin
Alfirk
Cepheus
Algol
Mirfak
Algenib
Alpheratz
Schedir
Caph
Ruchbah
Segin
Navi
Tsih
Rucha
Almaak
Mirach
Sirrah
Andromeda
Pegasus
Markab
Scheat
Enif
Sadalmelik
Sadalsuud
Fomalhaut
Deneb Adige
Albireo
Sadr
Gienah
Aquarius
Aquila
Altair
Tarazed
Alshain
Sagitta
Delphinus
Rotanev
Sualocin
Vulpecula
Anser
Cygnus
Deneb
Sadr
Gienah
Albireo
Lyra
Vega
Sheliak
Sulafat
Hercules
Rasalgethi
Kornephoros
Ras Algethi
Corona Borealis
Alphecca
Serpens
Caput
Cauda
Ophiuchus
Rasalhague
Cebalrai
Sabik
Antares
Rasalgethi
Kornephoros
Ras Algethi
Alphecca
Bootes
Arcturus
Nekkar
Seginus
Izar
Muphrid
Canes Venatici
Cor Caroli
Chara
Ursa Major
Alkaid
Mizar
Alioth
Megrez
Phecda
Merak
Dubhe
Benetnasch
Polaris
Kochab
Pherkad
Rastaban
Eltanin
Etamin
Alderamin

1. The Agnostic Theory

That the universe really exists,—that there are such things as stars and planets,—that the earth is something which has an actual existence,—but few men will dare to gainsay. That there is something, moreover, observable in the universe which may be rightly termed order, or harmony, is also a fact, which but a very few individuals,—contrary to their better judgment,—venture to deny.

Therefore, we are justified in asking: Whence this visible universe? Is the order which we observe in it the result of chance, or is it the work of an intelligent Being? Was the world really created, or has it come into being of itself? Is the series of causes and effects, which we everywhere behold, infinite, or is there a Primary Self-existing Cause, from whom all things have their being?

Sad, indeed, would be man's lot here on earth, were he fated to grope about in the dark throughout his entire life, without even the hope of ever arriving at an answer to the all-important questions: "Whence?" "Whither?" and "Why?" Such is the unenviable view the *Agnostic* takes of the world, and of its inhabitants.

The first Napoleon, once, on a beautiful starry evening, interrupted a number of savants, who believed that they had relegated the Creator

to the domain of imagination, with the query: "But, gentlemen, who made the stars?" Tyndal, a fair representative of the Agnostic school, says in one of his works: "We do not know who made them."

The Agnostic claims to know, for a certainty, that he cannot solve the problem of this world's origin. He pleads ignorance, also, in regard to his own origin and destiny. He glories in the title of an ignoramus,—but, of course, only in regard to the origin of the world,—the existence of God,—the immortality of the soul,—Divine Revelation, and kindred questions.

It has always been a mystery to me how Agnostics,—men who commonly pretend to know so much about philosophy and science,—can nevertheless profess ignorance in regard to such a simple and patent truth as creation. Their manner of acting and speaking on things knowable and unknowable leads one to define Agnostics as men who say they know nothing, and think they know everything.

How easy it is for the adherents of agnosticism to close their eyes to the truth, and to profess ignorance, when certitude is readily obtainable, may be seen from the testimony of Charles Darwin, an acknowledged Agnostic: "Another source of conviction for the existence of God connected with reason rather than with feelings follows from the extreme difficulty, or rather impossibility, of conceiving this immense

and wonderful universe, including man, with his capacity of looking far forwards and far into futurity, as the result of blind chance or necessity. When thus reflecting, I feel impelled to look to a First Cause having an intelligent mind in some degree analogous to that of man."

The following incident well illustrates the disastrous *moral* effect of this baneful doctrine.

We are told that Robert G. Ingersoll,* was one morning seated in a Washington city hotel, looking out of the great window, when a United States Senator, coming in, said:

"Mr. Ingersoll, I saw a sad thing a moment ago. While a man was struggling across the crowded street on crutches, I saw another man strike the crutches away from him."

Ingersoll arose, with fingers twitching and eyes flashing, and said:

"I should like to see the man; I would punish him!"

The Senator put his hand on Ingersoll's shoulder and said:

"That is what *you* have been trying to do for years; striking away the crutches of people, the support of people in sorrow, the support of people in temptation."

*Cf. "The Catholic Fortnightly Review."—XIX, 10, 311.

2. The Materialistic Theory

The *Materialist* does not fancy being termed an "ignoramus"; hence, though shallow it be, he nevertheless advances a theory on the origin and destiny of the world. The adherents of Materialism contend that there is no such thing as creation in the Christian sense. The universe with everything it contains, according to their teaching, is one immense conglomeration of eternal and uncreated matter. They maintain that all matter is continually and necessarily entering upon new combinations, and this of itself, and independently of any Creator or Ruler endowed with intelligence and free will. In fact, the materialist acknowledges nothing,—either in himself, or in any other being,—superior to the dust trampled under foot. He would have us believe that minerals, plants, and animals have all developed from one and the same lifeless matter. He looks upon man as in nothing superior to the trunk of a dead and rotten tree,—as a mere mass of brute matter.

According to this crude theory, a person weighing, for instance, 154 pounds, is nothing more nor less than a combination of 101 pounds of oxygen, 21 pounds of hydrogen, 21 pounds of carbon, 3 pounds of nitrogen, 2 pounds of calcium, and a few pounds of various other mineral substances. This theory, at first thought,

certainly does seem somewhat too "gaseous" to be solid doctrine.

After a brief existence and so-called death, the materialist expects his remnants to pass into some other form of eternal and indestructible matter.

According to the Rev. Dr. Newell Dwight Hillis there are in New York City alone about 12,000 children taught every Sunday afternoon that there is no God, no Christ, no Revelation, etc. The author of the text-book used is Chipin. Here are some of the questions contained in the catechism used at these Sunday Schools:

Question: "What is God?"

Answer: "God is a word used to designate an imaginary being which people have themselves devised."

"How did man originate?"

"Just as did all animals, by evolution from lower kinds."

"Has man an immortal soul as Christianity teaches?"

"Man has no soul; it is only an imagination."

"Is it true that God has ever been revealed?"

"As there is no God, he could not reveal himself."

"What is Heaven?"

"Heaven is an imaginary place, which churches have devised as a charm to entice their believers."

"Who is Jesus Christ?"

"There is no God, and, therefore, there can be no Son of God."

"Is Christianity desirable?"

"Christianity is not advantageous to us, but is harmful, because it makes us spiritual cripples. By its teachings of bliss after death it deceives the people. Christianity is the greatest obstacle to the progress of mankind; therefore it is the duty of every citizen to help wipe out Christianity."

"What is our duty when we have learned there is no God?"

"We should teach this knowledge to others."

"Do you owe a duty to God?"

"There is no God, and, therefore, we owe Him no duty."

A refutation of such blasphemous and materialistic doctrines is therefore timely and needs no apology. It is well for us all, from time to time, to get back to the essential and fundamental teachings of religion, which is one of the aims of this little work.

The Materialist school of philosophy, then, conceives man as a "being that has its origin and destiny in mud."

Professor Vogt says: "Man is what he eats," "der Mensch ist was er isst." By dining on lobsters, one would, therefore, become a lobster! Yes, by accepting the materialistic view of the world one would go in the same direction intellectually, as does the lobster locally,—backwards.

Another says: "A man weighing 150 pounds is a conglomeration of the same substances that are to be found in 1,200 hens' eggs; hence," he concludes, "man is this and nothing more."

Still another* compares man with a cart, laden with manure, and having a lantern dangling from one of its axles.—Is it surprising that such men defend suicide as allowed?

The melancholy and illogical explanation of the world's origin and destiny, advanced by materialists, is so contrary to common sense that it does not deserve more than a passing notice. A lengthy and serious refutation of such absurd theories would be quite superfluous. Let it suffice to say that all matter is changeable; what is eternal and self-existing, however, cannot be subject to any change; for that which is eternal and self-existing is infinitely perfect. Hence the existence of an "eternal, self-existing matter" is as repugnant to reason as the existence of a round square. Besides, as every Christian child knows, man is endowed with intellect and free will and possesses an immortal soul. These faculties raise man far above every possible form of mere matter and the various kinds of irrational animals. "Man advances, the brute does not;" let materialists explain why this is, and not ignobly pretend that the fact is not substantiated.

There is an essential difference between man

* Schopenhauer.

and brute. Man possesses something more and something nobler than brute matter; hence, materialists shall never succeed in convincing a logical thinker. Their theory is exceedingly false and shallow.

> Nostrae supernam gentis originem
> Fastidit excors; dissociabilem,
> Umbras inanes mente captans,
> Stirpem hominum pecudumque miscet.
> —*Leo XIII.*

> Man's birth, as writ upon the Sacred Scroll,
> They loathe and spurn; and phantom shadows chase;
> From one vile germ, abhorrent things they trace:
> The beast's foul carcass and the human soul.
> *(Trans. by T. Campbell, S. J.)*

The celebrated astronomer, Athanasius Kircher, had one of these materialists among his many friends. In vain did Kircher point to the formal order of the universe in his endeavor to convert the unbeliever. The materialist entered the great astronomer's studio one day, and saw a beautiful globe of the earth standing on a table. After admiring its scientific construction for some time, he asked Kircher where he had secured that fine globe, and who had made it?

"Why," replied Kircher, "that globe, which you see there, came into existence of and by itself. It was not made by any one. Of its own intrinsic power, and independently of any exterior cause, it began to be."

"Do you take me for a fool?" said the materialist. "How could that be? Surely, everything that exists must have a sufficient cause for its existence!"

"Now, look here, my friend," retorted Kircher, "you deem it impossible for that little globe to begin to exist of and by itself, and yet maintain that its original,—the earth which we inhabit,—has its existence of and by itself! How often have you not been guilty of a far greater folly, in asserting that the earth,—a globe incomparably larger and more wonderful than this little sphere here,—has no Maker! That it came into existence by chance!"

The materialist was silenced. Buried in thought, he returned home and became a firm believer in the existence of a Creator.

3. The Pantheistic Theory

Pantheists err by going too far in the contrary direction. The materialist denies the existence of the human soul and its Creator. He boldly asserts that all creatures are forms of brute matter; whilst the pantheist contends that all creatures are forms, or modes, or determinations of the deity. Pantheists,—at least that class which constitute the vast majority of this philosophic school,—readily admit an Infinite Being upon which everything depends for its preservation; they obstinately refuse, however, to admit that man and other animals are

beings really distinct from this First Cause. The Pantheistic theory deifies man,—makes him either an emanation or a form of the Deity; in fact, it deifies every living creature,—the mosquito and the eagle, the ant and the crocodile, the elephant and the whale, the hare and the lion, the ape and man, are substantially one and the same God. According to this philosophic system man, as well as brute, is entirely devoid of individuality, and, consequently, also of moral responsibility for his actions. The Deity is the one responsible agent in the universe.—This philosophic system is a product of the lively imagination of the Oriental.

Pantheism contains many features which make it attractive, and even plausible to some minds; for this reason it is, perhaps, the most dangerous of the many false systems of philosophy. The Pantheistic conception of the universe finds especial favor with the vain and proud. Man, even before "that sin, which brought desolation into the world," aspired to be like to God. Hence, it must not surprise us to find this same tendency in the man of today, for it is a weakness of our corrupt and fallen nature.

If we are to accept the works of eminent pantheists like Spinoza, Pythagoras, Scotus Erigena, Avicenna, Fichte, Giordano Bruno, Schelling and Hegel as authoritative on this subject, it is easy to refute the vagaries of the pantheistic world-view. Pantheism tries to build without a

foundation. It professes belief in a Supreme Being, and in the same breath maintains that there is no essential difference between this Supreme Being and things outside of Him. It thus labors under an intrinsic contradiction, and is against sound reason. Pantheism is a veritable hodgepodge of confused and erroneous ideas. The pantheistic conception of God and the world is, likewise, contrary to Divine Revelation. It maintains that God,—"the immanent cause of all things,"—is enslaved to the laws of nature. God is not, according to pantheists, the absolute and Supreme Creator and Ruler of heaven and earth. In thus denying that God is endowed with sovereign power and authority, Pantheism creates an impassable chasm between the creature and the Creator, and robs the Almighty of every right and title to obedience and adoration on the part of His rational creatures. It illogically and sacrilegiously reduces God to the stuff of which the world consists, and, on the other hand, it raises man to the throne destined solely for the Almighty. Pantheism, therefore, implies Atheism.

None but phantasts and sentimentalists can be induced to admit the fallacies of Pantheism. Such fall an easy prey to its false and alluring tenets. Is it not the height of folly, moreover, to say that the rat is substantially the same being as the terrier that catches it, or that the driver is the very same being as his balky mule, or

again, that the "the blatant unbeliever and the Almighty,—whose existence he denies,—are both one and the same person?" Besides "everywhere throughout nature's vast domain, we seem to see a striving after individuality."* This fundamental principle strikes at the very root of Pantheism.

* "Right and Wrong."—Lilly, p. 108.

CHAPTER II

THE MINERAL KINGDOM POSTULATES A CREATOR

1. Proofs Furnished by Science and Revelation

I SHALL purposely omit the various other hypotheses and philosophic theories which fruitlessly attempt to explain the beginning and end of the universe, and shall now pass on to the Theist, or Christian, view.

This view of the universe is based on the teachings of sound reason and Divine Revelation. These two beacon-lights have been given man in order to illumine his path throughout life, and to safely conduct him to the blessed goal for which he was created. Therefore, according to the teachings of sound reason, under the guidance of Revelation, we must arrive at the only true conception of the visible creation, which, as I hope to prove, is the Theist view. What then is the *Theist* conception of the world? What explanation does science, in particular astronomical science, and Revelation give us concerning the origin of the visible universe?

> Living worlds to view be brought
> In the boundless realms of thought;
> High and infinite desires,
> Flaming like those upper fires!

Holy Truth, eternal Right—
Let them break upon my sight;
Let them shine serenely still,
And with light my being fill.

Thou who dwellest there, I know,
Dwellest here within me, too!
May the perfect love of God
Here, as there, be shed abroad.

Let my Soul attunéd be
To the heavenly harmony,
Which, beyond the power of sound,
Fills the universe around.
—*William Henry Furness.*

According to many modern naturalists, there probably was a time when the entire universe was in a chaotic state,—was a mass of atoms floating about in space immeasurable. Motion, external to these atoms, and, at some time or other, imparted to them from without, set that immense mass of matter revolving. One by one the stars and planets, thereupon, took form and shape; some retained the glowing heat which they received from their revolving motion; the sun, for example, and most all the fixed stars are still balls of gaseous, or molten matter; others again, like the earth and moon, in the course of time, cooled off and lost their light and heat. Ages upon ages passed by before a certain one of these countless orbs,—this globe of ours, called the earth,—became sufficiently cool to ad-



THE SUN.—SOLAR SPOTS.

mit of plants and animals on its surface. The atoms, which constitute the earth, had eventually become a compact mass of mineral matter around its outer surface. Through years and years of preparation by the waters, which rained down upon the earth, its rocky crust was finally ground into soil, and garnered in vast layers of sand and mud at the bottom of the seas, lakes and rivers. Mighty eruptions and earthquakes,—destined to shake this little dwelling of ours to its very foundation,—then elevated the rich sediment of the sea here, and sunk the barren plains of waste deserts there, till at last a fit abode for man and beast was prepared.

A few years ago I visited Yellowstone Park, Wyoming. The steam-jets and geysers, which are so numerous in that region, are directly traceable to the intense heat reigning beneath the crust of the earth. One district, called "Devil's Half-Acre," has hundreds of steam-jets puffing out of the ground. In the geyser basins of Yellowstone Park it is not necessary to build a fire to cook one's meals. The hot springs and steam-jets, heated by subterranean fires, furnish heat equal to that of any range.

Other manifestations of fire in the center of the earth are eruptions of volcanoes and earthquakes, such as the eruption of Mt. Pelée, on Martinique, that snuffed out 30,000 lives some years ago, and the earthquake in Sicily in De-

cember, 1908, that summoned about 200,000 human beings from time to eternity.

The immense ocean of fire which still rages so violently in the center of the earth is but a small residue of that primeval heat with which this our temporal home is believed to have originally glowed.

Such, in a few rough sketches, is the history, given us by scientists, of the world's origin. Created by the Almighty, the atoms of matter which constitute the visible universe were originally in a state of chaos; at the Creator's bidding, motion was given that immense mass of matter, and the heavens and the earth were made. *How* the celestial phenomena were made, whether according to the meteoric hypothesis, which is highly probable, or according to the nebular theory does not concern us here. To enter upon the "How," would lead us away from our subject.

Let us now pass over to the account of creation, as recorded by the Inspired Writer, and see whether it harmonizes with that given by scientists? What does Divine Revelation say concerning the origin of the world and of its chief inhabitant,—man? We read in the first chapter of the Bible: "In the beginning God created heaven and earth."—Gen. 1:1.

Here we have a clear and concise answer to the pregnant questions: "Whence is creation?" "Whence are the finite and lifeless atoms of which the universe was formed?"

That the material universe could not have made itself is evident; moreover, that it could not have been self-existent from eternity needs no proof; hence it must have been created. Now, "to create means to produce out of nothing." The first chapter of Genesis, then, asserts that the world was created. "Heaven and earth," or the entire material universe, was made out of nothing by the Omnipotent Creator. The initial act of creation was absolutely necessary in order to give that which before was only possible, *actual* existence. The constituents of the universe once created and set in motion, the mighty interchange of physical forces and elements began. Every particle of matter rushes towards or around some center of attraction. The atoms rapidly collect in masses of molten matter, and take form and shape. The stars, planets, and solar systems gradually evolve from chaos. One of the many celestial bodies that eventually secure individuality and take spherical form is the earth. But "the earth is," still, "void and empty." v. 2.—"God," thereupon, "made a firmament, and divided the waters that were under the firmament from those that were above the firmament." v. 7.—Floods of rain pour down from the overcharged atmosphere upon its cooled and hardened crust of mineral substances. The waters of the sea and of erosive streams roll, crush, and grind the earth's hard surface into gravel, sand and soil. When this

little globe was sufficiently prepared, the vegetable kingdom appears on the scene. "And God said: Let the earth bring forth the green herb, and such as may seed." v. 11.—Vegetation bursts forth with great exuberance, assimilates whatever it finds congenial, and gains an easy victory over the material kingdom.

Our Palace Wonderful gradually assumes form and symmetry. Everywhere this home of ours then becomes adorned with vegetation. Plants, shrubs, flowers and trees fringe the rivers, lakes, seas and oceans, manifesting their superiority over the mineral kingdom.

The vegetable kingdom, however, readily surrenders its scepter at the bidding of the Almighty to a still higher class of creatures, who take possession of the air, sea and land. The new-comers thrive on the food that had been provided. They enliven the earth, and dominate over its oceans and continents: "And God said: Let the earth bring forth the living creature in its kind, cattle and creeping things, and beasts of the earth according to their kind."—Gen. 1:24. But these, too, are destined to serve a higher type of creature.

After his home is sufficiently prepared by the elements, adorned with plants, and enlivened by birds, fishes, and animals, man goes forth from the hand of the Creator to "rule over the fishes of the sea, and the fowls of the air, and all living creatures that move upon the earth."—

Gen. 1:26. "And God made man according to His own image."—Gen. 1:27.

It is irrelevant to our theme whether the Inspired Writer here intends to give a scientific and chronological description of the various events and details narrated according to actual sequence as they occurred in nature or not. What we maintain is, that, according to the account in Genesis, the visible and material world originated by *creation.*

The "Six Days," moreover, of the Hexaëmeron cannot be said to contradict the certain data of geology and palæontology; for it is not clear what is signified by the term "Six Days." If the words in the following verses 17 and 18 be interpreted in their literal sense it is plain that "Day" in Genesis does not signify a period of twenty-four hours; for there we read that only "on the fourth day," "God set two great lights in the firmament of heaven to shine upon the earth, and to *rule the day and night,* and to *divide the light and darkness.*"—vs. 17 and 18.

A number of exegetes of eminent authority believe that the history of the creation, as here recorded in Genesis, was revealed in visions; according to this interpretation, then, "the Biblical Hexaëmeron may be explained in the way in which other Biblical visions are interpreted." No matter how the first chapter of Genesis be taken, it cannot be said that the "Six Days" must be days of twenty-four hours. "Their real length of time is not determined by Scripture."

It cannot be denied, however, that the Book of Genesis is replete with difficulties, and, so long as the Church has not given an authoritative interpretation, the student of Scripture is more or less free to get what meaning he can therefrom. But no one can logically deny that its first and second chapter clearly and indubitably teach the origin of the universe by creation. They, likewise, teach that plants, animals and men owe their existence to separate and special creative acts.

Such, then, as we learn from true science and the Revealed Word of God is the origin of man and his temporal home. Both these sources of knowledge teach us that the entire material universe and every animate as well as inanimate substance that it contains, was at some time or another called into being by an Independent Primary Cause. "The Lord spoke, and they were made; He commanded, and they were created." —Ps. 32:9. "Of Him, and by Him, and in Him are all things."—Rom. 11:36.

2. Proofs Taken from the Sidereal World

And if we turn our attention from the planet we inhabit, and cast a glance at the other planets and stars in their relation to the earth, we are compelled by right reason, no less than by Revelation, to admit a Creator, to whom, also, all the other spheres owe their existence. The harmony, too, we behold among the celes-

tial bodies, clearly proves that they must needs be under the dominion of an All-wise and Supreme Ruler.

Were we to enter a house and find everything in the best of order we certainly would believe it to be under the management of some person. Now, what sane and intelligent man can contemplate this grand and superb temple of the universe, which constitutes our temporal home, without admitting a Creator, who has designed and arranged it?

Or, again, let us suppose that an inhabitant of some uncivilized island were suddenly to chance upon a beautiful watch. Whilst out hunting, he finds to his great surprise, the wonderful work of art lying in some out of the way place. Now, would that unsophisticated child of the forest primeval perhaps think that the watch had grown out of the ground? Or that it may have come into existence by chance? Certainly not! Though he had never beheld anything of the kind before, after a little reflection he would rightly conclude that the timepiece must be the work of some intelligent being. He would instinctively admire its beauty and workmanship, and from its accuracy of movement, and harmony of action, arrive at the conviction that such an accurate and harmonious movement could not be the result of chance, but that it must needs be the work of some one more skillful than himself.

Now, no less wonder and admiration is excited in the mind of every intelligent man who contemplates the exquisite beauty of the starry firmament, and reflects on the accurate and harmonious movement of the solar systems. The order and design which they reveal force every unbiased and intelligent mind to admit the existence of a Superior Being,—a Wise Designer, who called those celestial spheres into being and directs their every movement.

I say a *Wise Designer.* For wisdom is defined as the adaptation of means to the end, whilst design is defined as formal or intended order. Now, who can view the stupendous work of the universe without acknowledging that it must needs have been made, and that by an infinitely more perfect Being than ourselves? Who can behold it in its entirety, without being filled with awe and admiration at its order and design? Like a colossal machine in motion, the countless stars, planets and other heavenly phenomena move with the precision and regularity of the most skillfully made watch. Ask the astronomer, and he will tell you that the intricate harmony which is everywhere discernible among the celestial bodies,—and this in spite of their almost incomprehensible number, volume, velocity and distance,—clearly proves an intended order. There is always manifest the hand of a Wise Designer, and the sway of a Supreme Ruler.

The visible universe appears at its best on a bright and starry night. When thus contemplating the firmament by night, we at once naturally speculate on the number of stars we there behold. Though the number of stars is simply beyond imagination, yet it is not infinite. Nor are there as many stars discernible to the *naked* eye as one would, at first sight, think.

On a clear starlit night one cannot discern more than 4,000 stars from any one place in the United States with the naked eye. With the aid of an ordinary opera-glass about 100,000 can be seen. A telescope with a lens of ordinary size will greatly increase this number. With each increase in the size of the lens, new stars are revealed, where before nothing save interstellar space was discernible. The great "Lick Telescope, which has a diameter of three feet, reveals about 100,000,000 stars."* Through the Yerkes Telescope, which has a forty-inch lens a much larger number is discernible.

The number of stars in the universe is, undoubtedly, much larger than the number of visible stars. Professor Newcomb, in one of his latest works, says: "The total number of stars is to be counted by hundreds of millions."

Relatively, therefore, when admiring the firmament, we can distinguish but a very small number of the celestial bodies that are there scattered about in profusion; for, about "20,000

* "General Astronomy."—Young, No. 790.

stars are now known to exist for every one we see with the naked eye."*

Our amazement increases, moreover, when we reflect on the colossal bulk and volume of some of those mighty luminaries that adorn the firmament. He who closely follows the course of those bright constellations will tell you of celestial orbs in comparison with whose size our little globe fades away into insignificance.

There are comparatively few persons who are able to form a correct idea of one thousand square miles. Now, the earth has a surface area of 197,000,000 square miles. Were we to set out on a journey around the world, the trip after the second or third week would seem interminable. Yet, we know that there is not a single fixed star within the range of the telescope that is not much larger than the earth.

The planet we inhabit has a diameter of 8,000 miles; the planet Uranus measures 32,000 miles through its center; whilst Neptune has a diameter of 35,000 miles, and Saturn 73,000; including its ring system, which supposedly consists of clouds of tiny satellites, this planet has an external diameter of 168,000 miles. Jupiter, the largest of the planets, is 1,300 times the size of the earth, and has a diameter of 86,000 miles.

* "The Pith of Astronomy."—Bayne, p. 82.

Note: When giving the size, area, volume, distance, or velocity of the celestial phenomena and planets I have designedly used round numbers, in order to help the memory of the reader.

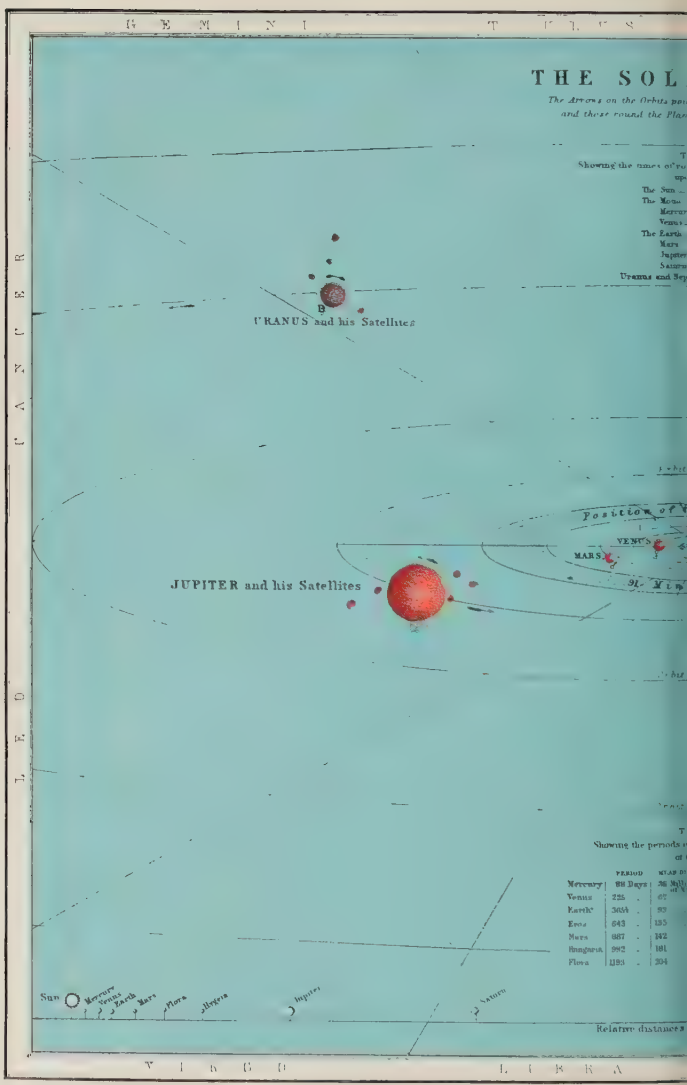
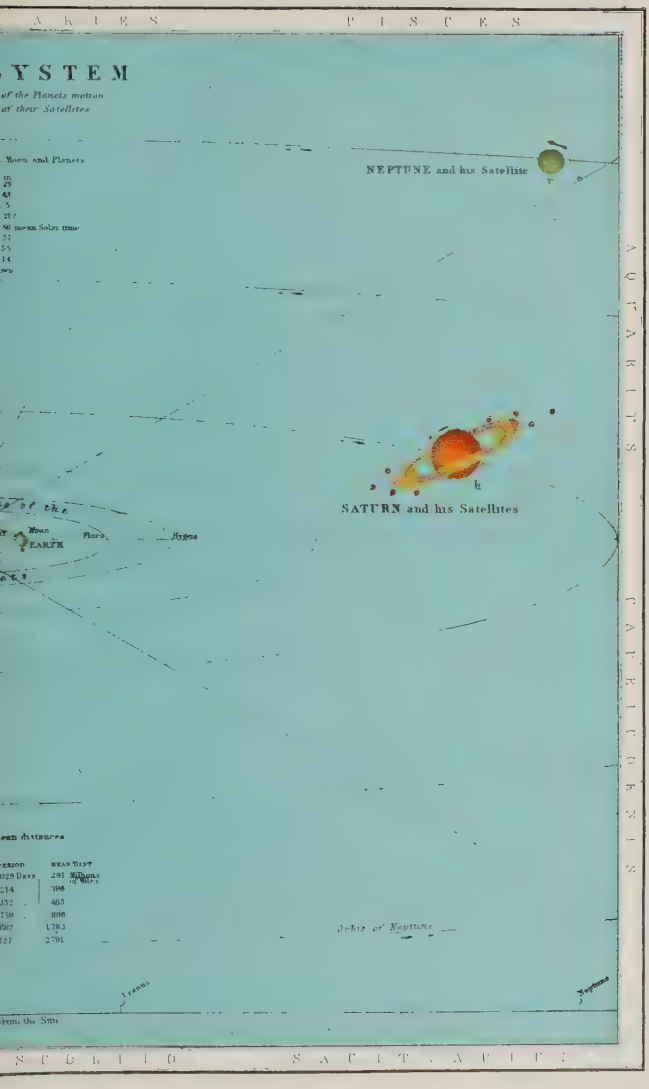


PLATE II.—TH

ORBITS AND COMPARATIVE SIZES OF T



R SYSTEM.

ANETS IN THE SOLAR SYSTEM.

But even the largest of the planets is little when compared with the sun, or any one of the fixed stars.

The great luminary which the Almighty called forth from nothingness to preside over the day, possesses a bulk of matter 318,000 times that of the earth and moon together; its diameter measures 850,000 miles. We can best gain an idea of the almost incomprehensible size of that immense globe of fire by applying a familiar standard: "If we imagine our little globe to be within the sun so that the center of the earth would coincide with the center of the sun, and the moon would continue on its path about our planet as at present, the sun would not only include the lunar orbit, but its surface would extend almost as far again beyond it; now, if we recall to mind that the mean distance of the moon from the earth is 240,000 miles, what vast proportions does not the sun assume"! The sun's volume is over one million times that of the earth! Were the sun a hollow globe 1,300,000 spheres the size of the earth could be thrown into it.

Again, astronomers tell us that the sun is relatively small when compared with the majority of the fixed stars.

The variable Algol, for example, in the constellation Perseus, a star that ranges from the second to the fourth magnitude, appears to our naked eye to be one of the smallest of the heav-

enly bodies; yet that "little twinkling gem" is almost one million miles in diameter; and its companion which travels around it at a distance of three million miles, measures 800,000 miles through its center. "Many of the fixed stars are much larger than the sun, and more luminous."

In spite, however, of the great diversity of size and weight among the heavenly bodies, they all have a certain and fixed size and weight. The asteroids, of which there are about 600 known, exist in great number between the orbits of Mars and Jupiter, and all travel in the same direction. The smallest of the asteroids, which might more appropriately be termed planetoids, are, perhaps, only a few miles in diameter, whilst the largest are about 300 miles in diameter. Yet the smallest one of the celestial phenomena, as well as the largest, has a determined size and weight. Yea, this may be said, with equal truth, of the universe itself.

Now, has mere chance given those celestial bodies their size and quantity? Or have their size and weight been determined, perhaps, by themselves? Certainly not by chance. For an effect can never be superior to its cause. But, one might say, they have been determined by the fixed and inherent laws of the forty or more elements which constitute those phenomena. True! But, whence, I pray, are these physical laws? Does not every law suppose a law-giver?

Or whence came that primordial matter, the size and weight of which the physical laws have determined?

View the heavenly bodies as we will, we are compelled by right reason, no less than by Divine Revelation, to admit a First Creative Cause, that called them all into being; and upon this First Creative Cause they depend for their existence and its continuance. Yes, the Almighty it was, "who weighed the heavens in His palm, who has poised with three fingers the bulk of the earth"; Isaias 40:12. He has "ordered all things in measure, and number and weight." Wisdom 11, 21.

Again, no right-thinking man can contemplate the precise and intricate motion of the planets and stars, without admitting an intelligent First Cause who imparted to them the laws by which they are kept in their proper orbits and relative positions. When we view the celestial bodies and their mutual relationship our admiration for their great Designer's power and wisdom must necessarily be enhanced.

"Any particle of matter attracts any other particle with a force proportional inversely to the square of the distance between them, and directly to the product of their masses." And motion in any material body causes motion,—although infinitely slight perhaps,—in all the others. In spite, however, of this constant and universal unrest, there is a total absence of lawlessness.

Our earth flies through space on its course

around the sun at the rate of 18½ miles per second, i. e., "75 times as swiftly as a cannon ball."* "If a railroad train traveling at sixty miles an hour were to start out on the earth's orbit around the sun, it would take 1,200 years for it to complete its journey. The earth makes this same distance in just one year." We, here on the earth, at the present moment are traveling at the tremendous speed of "1,500,000 miles every day."† And yet the earth is always on time,—never a single moment too early, or too late.

The planet Mars rushes on at the rate of 15 miles per second, and completes its orbit around the sun at a mean distance of 141,000,000 miles from it, once in 687 days. The axial rotation of this planet has finally been settled on as being 24 hours, 37 minutes, 22.67 seconds.

Mercury, which is the nearest of all the planets to the sun, has a velocity of 29 miles per second.

Jupiter, the largest of the planets, travels at the rate of 8 miles per second, completing his year in 11 years, 10 months, and 17 days.

No less accurately does Saturn, with his eleven moons, pursue his course, speeding onward through space at the rate of six miles per second.

And if we leave the planetary realm for that

* "Elements of Astronomy."—Young, p. 45.
† "Pith of Astronomy."—Bayne, p. 25.

of the fixed stars, also, here shall we find all in motion. The name "fixed" star is a misnomer. There are no fixed stars in the strict sense. The so-called fixed stars of the Dipper, for example, are moving earthward at about 19 miles per second. The vast majority of stars are thought to be traveling in a straight line at an average speed of 20 miles a second. The fixed star, called 61 Cygni, which can be seen with the naked eye, "travels at the incomprehensible speed of 100 miles per second." Not even this star, however, can keep pace with Arcturus and a few others.

Comets, too, travel at great speed. The comet of the year 1843, which is expected to return again in A. D. 2219, has the tremendous velocity of 340 miles per second.

Finally, not only are the individual stars, planets and other celestial bodies moving through space at an enormous speed, but, also, the whole solar system is fleeing onward in the direction of "Alpha Lyrae" "at the rate of 12½ miles per second."*

The area, too, or superficial extent of some of the celestial phenomena is beyond the comprehension of the strongest human mind. The comets, for example, those stray visitors, that come from the stellar realm to pay their homage to the great monarch of our solar system, seem small to the naked eye. Yet the tails of these

* "Man's Place in the Universe."—Wallace, p. 91.

mysterious and beautiful apparitions vary from 10,000,000 to 100,000,000 miles in length.

How elevating, moreover, and yet how crushing, is the impression of space received from a study of the nebulae! It is supposed that there are about 150,000 nebulae floating around in space. About 10,000 of them are located and sketched. Professor Perrine has photographed about 750 nebulae. Some years ago I viewed the nebula of Orion, through a telescope in Europe. It appears to be the size of a human hand. Those best able to know, tell us that "if the distance of the nebula of Orion be taken to be that of a star of the eighth magnitude, a portion of it not more than ten seconds in diameter must spread over an area exceeding the dimensions of the sun two trillion times."

"Many celestial phenomena, which have the appearance of nebulae, are star-clusters, and are believed to form solar systems no less grand, extensive, and harmonious than our own solar system." Some clusters are known to have a thousand or more stars. That of Perseus has about 2,000 stars; the cluster "Omega Centauri" shows 25,000 per square degree; the "Milky Way,"—the luminous belt that encircles the material universe,—"is made up almost entirely of stars from the eighth magnitude down."

"It is owing solely to their great distance that many assemblages of stars appear, like the Galaxy, as nebulae, or confused clouds of lu-

minous matter. Could we from any one of those distant worlds see this solar system to which our earth belongs, it, too, would undoubtedly have the appearance of a nebula, or faint patch of misty light"* floating about in space.

But, you will quite naturally ask, if the celestial bodies have such an immense size, why is it that they appear to be so little, mere dots or points of light? If their velocity is so exceedingly great, why do they always appear to occupy the same relative positions? This is due to their amazing distances from us. The distance which separates the earth from the other celestial bodies is simply appalling. What an overwhelming idea of distance does not captivate the mind that strives to measure the proportions, according to which the universe has been established!

Distance is defined as the extent of a straight line between two points. It is easy to represent to ourselves the extent of a straight line, or the distance, between here and some other city that ranks with our own in importance. It is, likewise, easy to gain a clear idea of the distance, for example, to San Francisco, or to the Philippine Islands, which are about 7,000 miles distant. The task becomes more difficult, however, if we try and conceive the distance around the earth,—25,000 miles,—or the distance to the moon,—which is 240,000 miles,—or, again, to the

* "Select Reading Lessons."—p. 92.

sun,—which is situated 93,000,000 miles from here.

In order to gain a faint idea of the incomprehensible distances which lie between our planet and some of the other spheres of the universe, let us enter an imaginary express train. Traveling at the rate of the Twentieth Century Limited, that is about 60 miles an hour, it would take us at least 70 years to reach our nearest neighbor among the planets,—Mars. The farthest planet known to us at the present time is Neptune, which would be reached by our train in about 6,000 years.

"If a cannon-ball," says Professor Newcomb, "fired from our planet to celebrate the Declaration of Independence, in the year 1776, had continued on its course ever since that remote date, with a velocity of 1,800 feet per second, it would not yet be half way to the orbit of Neptune."

The mean distance of the earth from the sun is 93,000,000 miles; of Mars, 141,000,000; of Jupiter, 483,000,000; of Saturn, 886,000,000; and of Neptune, 2,793,000,000 miles. Astronomers are looking for planets beyond Neptune, and, no doubt, they will be successful in their search for new worlds.

Beyond the orbit of Neptune, the farthest known planet, there is, all around the solar system, an immense ocean of space, which seems to contain naught save ether. Outside of and beyond this uninhabited etherial ocean, which

encircles our solar system, lies the boundless realm of the fixed stars. There we behold, night after night, those bright little twinkling suns that appear to ever occupy the same relative positions.

What amazing distances does not a study of the fixed stars reveal! "The nearest one of the fixed stars is some twenty-six millions of millions of miles from the sun." "It would take an express train about 73,000,000 years to reach it."

We had better abandon this mode of travel, if we hope to reach the confines of space, and speed onward solely in mind. In measuring the distances of the stars, astronomers are wont to use the lightyear as a standard. An astronomical lightyear signifies the distance traversed by light in one year. Though light travels with the rapidity of 186,000 miles per second, nevertheless it requires about four years for the light of the nearest star to reach us. The light of the farthest star, whose distance is known, requires at least 200 years to reach our eye.

When we look at the little gem, that is called the Polestar, we behold the light that left this star forty-four years ago.

The Galaxy, that luminous belt of stars which Agnes Mary Clerke beautifully calls "the hem of the robe of the Most High," "has a distance of 500 lightyears." When we admire the Galaxy, therefore, we are beholding the light that left it before the discovery of America by Columbus.

What is still more incredible, it is thought by some scientists that there are stars which have been created in the beginning of the world whose light has not yet reached us; and this in spite of the fact that in less than one second of time, yea, in the twinkling of an eye, light can make the tour of the globe,—a distance of 25,000 miles.

One can obtain a fair idea of the great distance which lies between us and the stars by remembering that if the entire firmament, with its 300,000,000 or more glowing suns, were annihilated, we would perceive no material change within the first four years. Then, the bright star, Sirius, and a few others, whose light requires eight years to reach the earth, would disappear from view. Subsequently, one after the other would fade from our sight till the last non-existing star would cease to be seen.

"It seems quite certain that the distance of the remotest stars in the stellar system must be from 10,000 to 20,000 lightyears."



The Planet Saturn.

3. Proofs Deduced from the Mechanism, Harmony and General Plan of the Visible Universe

"The spacious firmament on high,
With all the blue ethereal sky,
And spangled heavens, a shining frame,
Their great Original proclaim."
—*Addison.*

Seemingly lost amid the almost infinite space occupied by the visible universe, one of those millions of celestial bodies that are profusely scattered about in space inconceivable,—is this little planet we inhabit. From a material point of view, the earth, when compared with the rest of creation, is a mere atom; but when viewed from a higher and rational plane, it is the most important of all the spheres.

The position of the earth in the solar system to which it belongs, evidently proves that, from the very beginning, it was destined to be the home of man. According to some scientists, the sun occupies the center of the visible universe. But be this as it may, we know for a certainty that our globe retains that particular orbit, distance from the great oven of the universe, and axial declination which are required to produce the four seasons of the year. No other planet is adapted for the muscular energy and temperament of man and brute. "In this fact, alone,"

says Mr. Main, "we have a beautiful specimen of design, and of the adaptation of the globe,—to the nature and constitution of its inhabitants." And yet, we receive only a two-billionth portion of the heat and light given out by the sun. No doubt, we all are content with this small amount of heat, and everyone is quite willing that the earth continue on her prescribed orbit at a distance of ninety million miles from that unfailing source of energy.

The moon is our next door neighbor; she can be called such, even though she keep herself at a distance of 240,000 miles from us. The moon is much smaller than the earth, its area being about equal to that of North and South America. Our satellite is nothing but a dead cinder. It possesses neither light nor heat of its own.

Yet the moon does us very good service. The tides, for example, which purify the oceans and prevent them from becoming stagnant, are due to the attraction of the moon. At regular intervals, too, the moon illumines our planet by reflecting the sunlight, which falls upon it.

Owing to the fact that the moon revolves on its axis in just about the same time that is required for it to travel around the earth, it necessarily presents but one side towards us. In spite of the great distance of the moon from us, the topography of the side which is constantly turned towards the earth is almost as well known as the topography of our own globe.

"Mr. Schmitt, alone, has observed and sketched over 30,000 crater holes on the moon."

However, notwithstanding the great progress astronomical discovery has made along these lines it takes a pretty good telescope to see the "traditional man in the moon." I may add, too, that it requires not a little good will to believe the gentleman from Pennsylvania, who claims to have seen a herd of cattle a few years ago grazing in a meadow on the moon. There are no meadows or cattle on the moon. Owing to the absence of an atmosphere, life is impossible.

Here on the earth we have such a variety of weather that we never tire speaking about it. On the moon there is no atmosphere. Nor is there any water on the moon. The peculiar topography of the moon is due largely to the absence of air and water.

Now, if we rise in spirit from this terrestrial home of ours, and allow ourselves to be wafted on the fleet wings of imagination to the uttermost limits of space,—ah, what an immense and overwhelming sight do we behold! What an intricate, and yet harmonious, movement is observable among the myriads of worlds at our feet! Like an immense machine in motion, every orb of the visible universe contributes its share to the grandeur, unity, and harmony of the whole. There is no haphazard collision. Each and every planet follows its path at its prescribed rate of speed. All is beauty and harmony.

The meteors and shooting stars that we see flit about from time to time only serve to emphasize the harmonious action of the universe as an entirety; they are like the molecules of dust that find their way into the works of a watch, and are tossed from the wheels as soon as these are set in motion.

Everywhere, and at all times, a formal and beautiful* order is maintained in the motion of the heavenly spheres. Transits, comets and eclipses are foretold with the greatest accuracy many years before they become visible. The transit of Venus across the disc of the sun was beheld by countless thousands some years ago; we know that in the year 2004, at a certain hour, minute and second, a little spot shall again be seen entering the disc of the sun,—and that spot will be Venus, the next in brilliancy of the heavenly bodies to the sun and moon.

Comets, too, can be traced and sometimes foretold. Several years ago the advent of Halley's comet engaged the attention of the scientific world. Halley observed this comet in the year 1682, and, applying the principles of Newton, fixed its period at seventy-six years. He asserted that the comet would return again in the year 1758, and staked his reputation as a scientist on the fulfillment of his prediction. The comet appeared again, after his death, on Christmas Day of the year foretold by him—1758. The orbit of this beautiful comet reaches out beyond

*Cf. any reliable Nautical Almanac.

that of Neptune. The best view of Halley's comet was obtained on May 19th, 1910, as on that day it was nearest to the earth.

A Papal Bull, ascribed to Calixtus III, is sometimes mentioned in connection with this comet. The Bull is a myth, and is made the occasion of slanderous attacks against the Church. There is no such Papal document which makes mention of Halley's comet, and orders that supplications be made to avert evils which, according to the opinion of the astronomers of the day, would "follow in the wake of the comet."

Halley's comet has come and gone about twenty-five times since the year 12 B. C., without bringing any calamity to the human race. The mission of a comet, like that of the other celestial phenomena, is not to frighten and destroy, but to instruct and enlighten. They all contribute their mite towards an immense harmonious whole.

A comical incident illustrating this truth happened in China a few centuries ago. When Father Matthew Ricci, S. J., who died in Pekin, in the year 1610, went to China as a European missionary, he soon acquired great renown on account of his knowledge of astronomy. His fame reached the Emperor of China, who summoned him to court to be examined. The established astronomers undertook the task, and reported that the foreigner's knowledge of astronomy was very limited. Father Ricci, S. J., ap-

pealed from their judgment, and challenged them to calculate the next eclipse of the moon. Although the Chinese astronomers despised "the stranger without queue and nails," yet their reputation was now at stake. Public opinion obliged them to accept the challenge. Confident of success, they calculated and published the time of the next eclipse. Father Ricci likewise calculated and published his time for the occurrence of the eclipse, which was soon to occur. As the event proved, Father Ricci was correct to the second, whilst the court astronomers were fifteen minutes wrong in their calculation. The Emperor, hearing of this, cited his astronomers before his royal court and demanded an explanation. "Your majesty," replied their spokesman, "the explanation is simple; this stranger here bewitched the moon." "Well, then," said the Emperor, with a smile, "you shall continue to be servants of the moon; but I constitute this man her controller."

Some years after the discovery of the planet Uranus, by Wm. Herschel, on the 13th of March, 1781, it was observed that that planet was affected by an unknown star. Uranus was noticed to vary not a little from the course which it should have maintained, and that it occupied a position quite different from the one it would have held had none but known agents been exerting an influence upon it. Accordingly, Le Verrier, in France, and Adams, in England, two of

the greatest mathematicians of modern times, undertook to locate the whereabouts of a conceivable planet which could produce the disturbances noticed in the course of the newly discovered Uranus. On the 18th of September, 1846, Le Verrier wrote to Dr. Galle, the astronomer in charge at the Berlin Observatory, requesting him to direct his telescope on a particular spot of the sky, which was carefully indicated, "and there," said the great mathematician, "you will find a planet which neither I nor any other human being has ever beheld, but which, nevertheless, must lie in that particular spot of the heavens, because calculations have pointed out the necessity of its existence." This astonishing prediction was literally true. The mischievous agent was discovered to be Neptune, a planet 2,793,000,000 miles from the sun, and possessing a bulk 250 times that of the earth.

One of Napoleon's officers asked that great general one day in a jesting manner, how he could believe that there is a God, since he had never seen Him? "Listen, and I will tell you," said Napoleon. "You say that I have a talent for war. When we used to go to battle, if there was any important movement to be made, you were the first to come and look for me, and everyone cried out, 'Where is the Emperor?' And why so? It was because you trusted in my talent, yet you had never seen it. Did you, then,

doubt its existence? No. My victories proved that it existed, and hence no one called it in question. But which of my victories could be compared to any of the wonders of creation, which all bear testimony to the existence of God? What military movements can bear any comparison with the movements of the heavenly bodies? My victories made you believe in me; the wonders of the universe make me believe in God."

The learned St. Athanasius well says: "When we see a work of an excellent sculptor, we recognize the hand of the unseen artist in the proportion of the parts and grace of the whole; so the visible universe tells of the unseen Creator; the motions of the heavenly bodies, so orderly, yet so diversified, irresistibly lead to the conviction that they are under guidance." Yes, with the royal Psalmist we are compelled to exclaim: "The heavens show forth the glory of God and the firmament declareth the work of His hands."—Ps. 18:2. They are, indeed, the work of the Almighty, of Him "Who sendeth forth light and it goeth; He hath called it, and it obeyeth Him. And the stars have given light in their watches and rejoiced; they were called and they said: Here we are; and with cheerfulness they have shined forth to Him that made them."—Baruch, 3, 32 sqq.

And when creating those stars the Almighty benevolently came to the aid of our utter help-

lessness and gave us a reliable time-piece. The huge clock which He then made and set going is to serve the nations for all ages. The immense clock of the universe always gives the correct time. It never runs down. Nor does it need repairing and adjusting. Its dial is the sun and its myriad hands, indicating time, are the earth, moon, stars, planets and comets. Let him who denies that this clock of the nations was made by a most skillful and intelligent Being be consistent, and not speak of the man's skill and intelligence who made his watch. If those celestial bodies, which follow their paths so accurately, are the work of a blind, unconscious force,—of a "Central Power House,"—devoid of intelligence and liberty of will, then surely that makeshift of an imitation,—a watch,—must be the work of blind force! The best time-piece ever made, moreover, requires tinkering, and adjusting. A few times a year, at least, it must be set and regulated according to the time given us by the clock of the Almighty. More than this! A sufficient intelligence, contemplating the God-given course of the various parts of God's clock, could tell us with the greatest accuracy their relative collocation at any definite hour, minute or second of some future day till time shall be no more. "Laplace has given us indisputable proof that the period of the earth's axial rotation has not changed the one hundredth part of a second of time in two thousand

years. Man cannot make a clock that will tell the hours for a single day with the exactness that this vast globe has done for all recorded time." We do well, then, to prefer the time indicated by the heavenly bodies to that given by our watch. The storm-tossed mariner, whose all is at stake, will certainly do so. He will continue to believe the stars even though the atheist assert that their movement is the result of chance. And so will every sane man ascribe the skill and intelligence revealed in the movement of the celestial phenomena to a Supreme and Intelligent Cause, who cannot err, nor deceive. And this sufficient causeless Being is the Almighty Creator of all things,—the source of all order and harmony. He hath "ordered all things in number, weight and measure."

An artist's skill, moreover, is not only measured by the size, beauty and symmetry of the work he accomplishes. Skill is most of all shown in the accomplishment of a great work with little means. Now what a surprise to the intelligent mind when one hears for the first time that this immense universe with all its manifold creatures consists of less than eighty elements!

It is commonly believed, moreover, that the universe is permeated with a subtle substance, called ether, and that this substance is the seat of gravitation. Every material object is under the all-pervading influence of this hidden force.

Owing to the universal law of gravitation, which was discovered by Newton, bodies attract one another in the ratio of their quantities inversely as the square of their distances. The entire visible creation, with its myriads of spheres, is kept in wonderful harmony by gravitation, combined with that tendency which all bodies in motion possess, of retaining the direction given them. By an artful combination, therefore, of the centripetal and centrifugal forces, imparted by the Creator, every sphere in the universe is kept in its proper orbit or path. And so skillfully has Divine Wisdom adapted these forces to the magnitudes of the planets and stars that they never deviate in the least from their prescribed courses.

We have, then, a double bond of union that pervades the entire universe, and makes it a complete entirety. We, as well as the most distant objects in space, are permeated and influenced by both ether and gravitation. The smallest molecule of matter, no less than the largest orb poised in space unfathomable, is under the absolute sway of these two irresistible forces. Were either of them to be destroyed, our satellite would soon collide with the earth, and both—the moon and the earth—fly towards the sun, and disappear in it as a snowflake, that falls into a conflagration. In fact, all the myriads of stars and planets would probably disintegrate, and drift back into chaos, whence they were evolved.

In viewing those luminous spheres that form a grand whole with the mind's eye, the truth of the poet's words become especially clear:

"No unregarded star
Contracts its light
Into so small a character
Removed far from our human sight,
But if we steadfast look
We shall discern in it,
As in some holy book,
How man may heavenly knowledge learn."
—*Babington.*

Everyone, therefore, of sane mind can attain to a certain knowledge of God from the contemplation of His handiwork, the visible universe. Yes, it may be said that it is impossible for any sane person to live long on earth and remain in ignorance of the Creator. Nor is this knowledge of God, as John Stuart Mill would have us believe, "An artificial production"; no, it is a most palpable, reasonable and natural truth. That there exists an All-wise Creator from whom all things have their being, is a truth that forces itself upon us at every turn. It is reflected by every creature in the universe: "Ask the beasts and they shall teach thee, and the birds of the air and they shall tell thee. Speak to the earth and it shall answer thee, and the fishes of the sea shall tell. Who is ignorant that the hand of the Lord has made all these things?"

So patent is this truth that none but the most

shallow mind can remain ignorant of it for any length of time. Indeed, it requires a much greater effort to deny the existence of a Creator than it does to accept this truth. The entire universe testifies to it. Hence we find that there never has existed a nation, or a tribe, that has not possessed a knowledge of the Deity. Although the individual, by abusing his free will, and by precluding all arguments to the contrary, can perhaps arrive at a disbelief in Almighty God, mankind as such cannot; the first nation, or even community, of sincere atheists or infidels has yet to be found.

Hence it is, that the Sacred Scroll blames the man, who does not possess this essential knowledge, and closes his eyes to the book of nature. "By the greatness of creatures," says the Book of Wisdom, "the Creator of them may be seen, so as to be known thereby." And again: "All men are vain in whom there is not the knowledge of God—and who by these good things that are seen, could not understand Him that is." And the Apostle of the Gentiles repudiates those as "inexcusable," who do not possess this knowledge. A clear idea of God, therefore, as He is reflected from the visible universe, can be easily secured by every man of sane mind and sound judgment. Nor can any man, in the possession of a sane mind, for even a brief length of time, blamelessly remain in ignorance of his Creator; and the man who rejects his belief in God, must

struggle against his better judgment in order to become an infidel. He, therefore, is utterly wrong who asserts that "creation is one conglomerate conjecture," or, "that we can only guess at truth," and "that the unanswerable questions of 'whence' and 'why' linger eternally on our lips." These questions are easily answered; they are answered in clear and unmistakable terms, both by science and by Divine Revelation,—by Astronomy and Religion.

The grand and stupendous work of visible creation loudly proclaims the existence of an All-wise and Omnipotent God. It is of little consequence when the Almighty created the universe, or *when* He determined the laws by which the celestial orbs are governed. It matters little whether the Supreme Architect, whose existence and infinite greatness we are forced to admit, determined the size, weight, position or path of the stars and planets instantaneously or gradually,—whether at a recent or a very remote date. Whether the telegrapher who flashes a message across the wire be at a distance of 100 or 1,000 miles, it matters little; in either case, we conclude with absolute certainty, that the regular ticks of the receiver correspond with those of the transmitter, and, in some way or another, are the effects of intellect and free will. They testify to a combination of matter, force and mind. So does the universe.

And if we examine this superb work some-

what in detail, it cannot fail to awaken in us a deep sense of awe, love and reverence towards Him who made it.

What mind is able to grasp the proportions according to which the Supreme Architect has designed and constructed the universe? Its magnitude baffles all description!

"Castor and Pollux have stood side by side in the heavens,—at least to human eyes,—for 4,000 years, yet they are flying apart at the velocity of sixty-eight miles per second, which in a day amounts to over 5,000,000 miles. This for forty centuries, and still they are 'the twins' to our eyes today."

The bright, reddish star "Sirius has a minimum speed of 2,000,000 miles a day, and yet it takes this star 1,300 years, apparently, to move but a few inches in the sky."

"The celebrated star, called 61 Cygni is a telescopic double sun; the constituent parts of it are forty-five times as far from each other as the earth is from the sun, yet it takes a powerful telescope to show any distance between these companions. No better illustration of the vast scale on which celestial mechanics are carried out can be found than by reflecting on this proposition."

When reflecting on the incomprehensible size of the material universe, we are instinctively prompted to exclaim with the inspired writer: "Great and wonderful are Thy works, O Lord

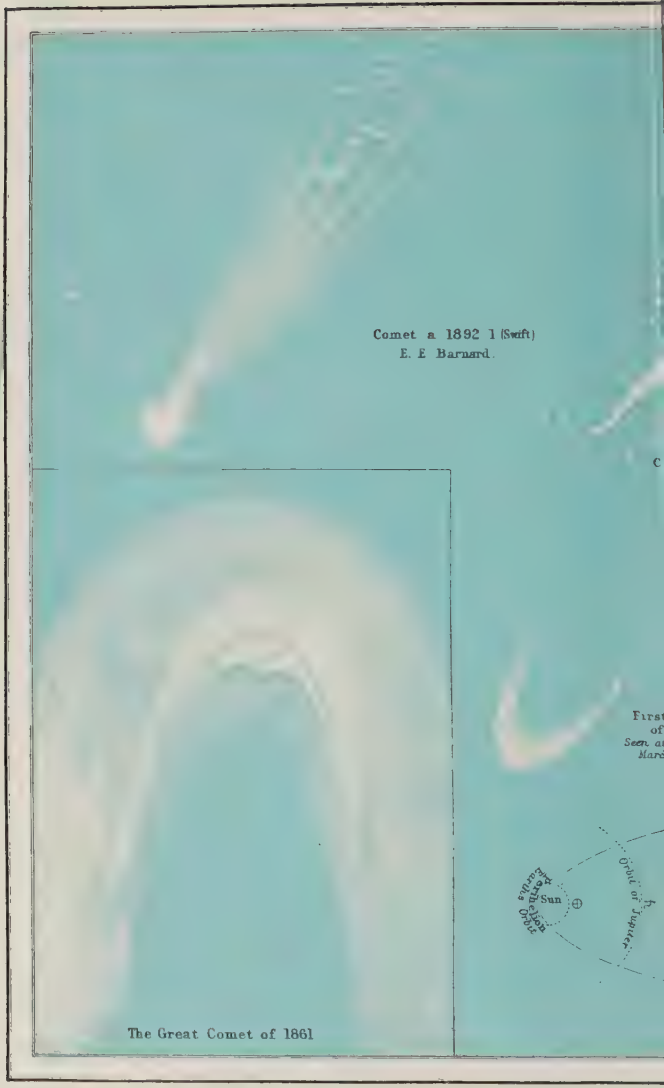
God Almighty." "Great is the Lord, and great is His power; and of His wisdom there is no number." He knoweth each of the "stars, and calleth them all by name."

And who is not inspired with a reverential love of the Almighty when beholding Him reflected by visible creation?

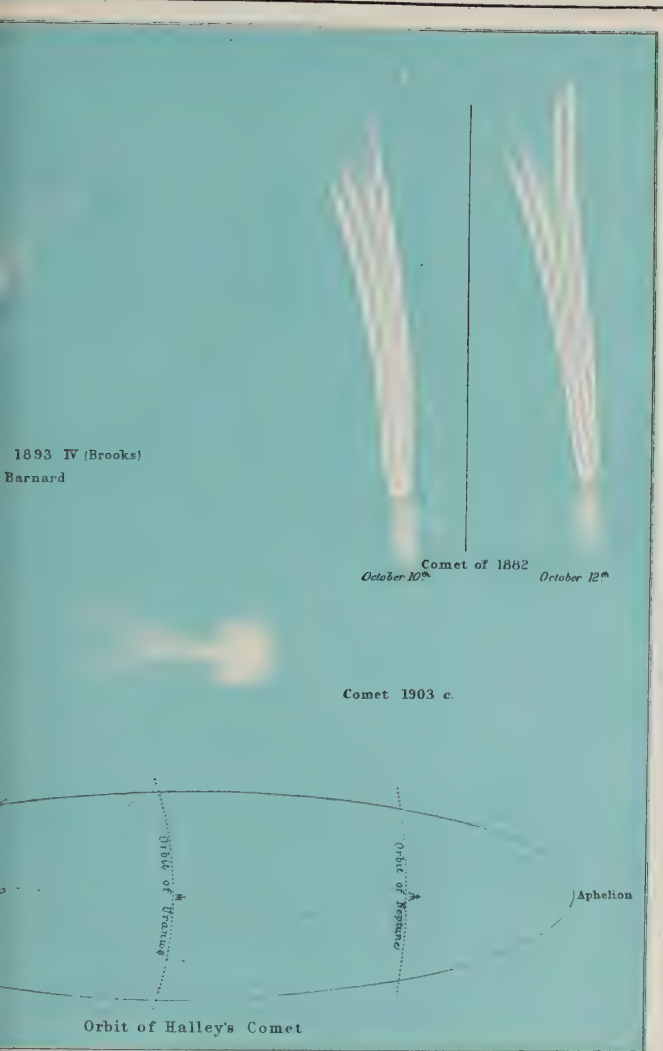
No effect can be superior to the cause that produced it. The perfections, which we admire in any work, are necessarily contained in him who made the work. Since, then, the multiplicity of the celestial bodies is so great, their size so immense, their path so varied, their harmonious movement so entrancing, their beauty so charming, their unity so perfect, ah, how incomprehensibly great and attractive must not He be who created them!

Tycho Brahe, the celebrated Danish astronomer, never entered his observatory to make a survey of the heavens without having first put on his court dress. Asked the reason for this, he replied: "If men dressed in honor of the king and court, they should not be less observant in the presence of their Maker." Sir Isaac Newton, another distinguished astronomer, was wont to tip his hat every time he heard the name of God mentioned, and this he did out of reverence for the Deity.

It seems to me that an intelligent view of the material world must of necessity awaken a deep sense of reverence for its Creator.


Comet a 1892 1 (Swift)
E. E Barnard.
The Great Comet of 1861
Sun
Orbit of Jupiter

PLATE


1893 IV (Brooks)
Barnard
Comet of 1882
October 10th
October 12th
Comet 1903 c.
Orbit of Uranus
Orbit of Neptune
Aphelion
Orbit of Halley's Comet

COMETS.

No man is able to duly appreciate the exquisite harmony of the celestial spheres! Countless is the number of stars. The paths of the stellar phenomena are varied and intricate. Many of the heavenly bodies have a three-fold, and some even a four-fold motion. Yet they follow their orbits and paths along curves, spiral, elliptic and hyberbolical courses with the utmost precision and regularity.

The universe, with its multitudinous variety of celestial phenomena so intricately and harmoniously revolving about one another, may be conceived as a musical instrument, attuned by the Almighty. With surprising celerity, the Creator at times changes the music of this grand instrument to new and extraordinary melodies; yet, though changed, the harmony of the spheres is perennially charming.

Those sweet and entrancing chords may be enjoyed by all who hearken. The faculty of hearing and enjoying the melodious strains of this myriad-stringed harp, makes us in a measure like to God,—the one last source of all true harmony. By means of this God-like faculty, man has in a certain sense, the power to create his own world, for it is capable of well-nigh infinite development.

"In reason's ear those orbs rejoice,
And utter forth a glorious voice;
Forever singing as they shine,
'The hand that made us is divine.'"

LAUDATE

Praise ye the Lord from the heavens; praise ye Him in the high places.

Praise ye Him, all his angels; praise ye Him, all his hosts.

Praise ye Him, O sun and moon; praise Him, all ye stars and light.

Praise Him, ye heavens of heavens; and let all the waters that are above the heavens praise the name of the Lord.

For he spoke, and they were made; He commanded, and they were created.

He hath established them for ever, and for ages of ages; He hath made a decree, and it shall not pass away.

Praise the Lord from the earth, ye dragons, and all ye deeps;

Fire, hail, snow, ice, stormy winds, which fulfill His word;

Mountains and all hills, fruitful trees and all cedars;

Beasts and all cattle; serpents and feathered fowls;

Kings of the earth and all people; princes and all judges of the earth;

Young men and maidens; let the old with the younger, praise the name of the Lord; for His name alone is exalted.

The praise of Him is above heaven and earth; and He hath exalted the horn of His people.

A hymn to all His saints; to the children of Israel, a people approaching to Him. Alleluia.—*Psalm 148.*

4. Speculations: Are the Other Worlds Inhabited?

THE HABITABILITY OF THE PLANET MARS

An interesting question, and one that presents itself in this connection, is: Are the other worlds, poised in space, inhabited?

There is no doubt that some of the other spheres in the universe are habitable. But whether they are actually inhabited is quite another question. I dare say this question shall always be a mere speculative one.

Professor Percival Lowell, A. B., LL. D., Director of the Observatory at Flagstaff, Arizona, claims, as did Schiaparelli before him, to have observed numerous lines, or "canals," on the planet Mars. The white caps, discernible at certain seasons of the year, around the two poles of Mars, Lowell believes to be large areas of snow and ice, which melt in spring and summer. From these and other phenomena, the learned professor concludes that the "red planet" is inhabited. The mysterious lines, according to him, are canals, which were built by the Martians to conduct the scanty water supply in spring and summer from the poles to the centers of population.

According to the testimony of Professor Harold Jacoby, former assistant to Professor Lowell, but at present Professor of Astronomy

at Columbia University, "The size of a Mars-picture made by the Lowell telescope is about the size of a pin-head." In these dots, magnified, the so-called "canals" were discerned. Hence, there is good reason for believing, says Professor Jacoby, that the "canals" may be the effect of "ray-," or "halo-illusion."

"At the annual session of the National Academy of Science, held in April, 1910, at Washington, D. C., Dr. George E. Hale, Director of the Mt. Wilson Solar Observatory, stated that he had reproduced photographs of the planet Mars taken with a larger telescope than that used by Professor Lowell, and according to his claim, under far more favorable circumstances. Dr. Hale contended that these photos showed only a mass of blotches and markings in no wise geometrically distributed,—as is the contention of Lowell. Photographs made by Professors Campbell and Barnard, of the Lick Observatory, were also shown, and these indicated virtually the same condition on the planet." And Professor E. W. Maunder, Superintendent of the Solar Department of the Royal Observatory at Greenwich, maintains that "none has ever seen a single canal on Mars. It were better for science, he adds, that the 'canal-theory' be abandoned completely." Professor Campbell, Director of Lick Observatory, has, moreover, carefully studied the spectrum of Mars, and asserts that there is no water on the planet. He maintains,

moreover, that "there is no single scrap of evidence that Mars is inhabited."

Yet many believe with Lowell that our neighbor planet is inhabited by beings of extraordinary intellectuality. Some even contend that it is possible to signal the Martians. The defenders of this absurd opinion had a good opportunity to give a tangible proof during the month of September, 1909. For on the 18th of September, 1909, Mars was as near to the earth as it will ever be. It was on that day 36,250,000 miles distant from us; whilst when it is farthest away, its distance is 225,000,000 miles from the earth. But I have not heard or read that anyone has succeeded in signaling those supposititious planetary inhabitants.

Maybe, the sagacious reader knows what "Judge" had to say about the savant, who maintained that a message could be sent to the Martians for $10,000,000? The opinion of "Judge" is, that all such messages be sent C. O. D.

In all earnestness let it be said that there is no good reason for "peopling" the other celestial spheres. There is no proof that any one of the celestial bodies, save the earth, is actually inhabited. A few scientists have advanced theories to this effect; but no certain evidence has been given for the belief that Mars or any other planet is actually peopled.

Many are no doubt desirous to discover other inhabited worlds than ours because they believe

that this fact would induce man to give greater glory to the Creator. I dare say, however, that this would not be the case. We know that there is nothing impossible to the Omnipotent Creator of all things. He could have created and peopled a million planets as easily as He did the one we inhabit. Why, then, should the discovery that there are living beings on another planet enhance *our* idea of the Almighty? True, this little globe, over which the Sovereign Lord has given us dominion, is but one of millions of spheres spinning onward through space inconceivable. Considered as an integral part of the stellar universe the earth is but a speck.

And if this globe of ours is but a speck compared with the vast number and vast size of the spheres floating all around us, then, indeed, it is a little difficult to conceive why it alone should be inhabited. But, if we enter upon the nature and destiny of man, the chief inhabitant of the earth, we may easily conclude that the rest of the material universe has been created as a setting and ornament to the earth, man's temporal home. Man is the image of the Creator, and endowed with a nature fully capable of appreciating such magnanimous generosity on the part of the Almighty.

Mr. C. de Kirwan, admitting the possibility of other habitable globes than ours, expresses the opinion that "the more astronomical science progresses, the smaller become the chances of

seeing physiologic life extended therein." In his excellent book on the Origin of the World, M. Hervé Taye seems to aptly put the present state of this fascinating question thus: "If it would be puerile to pretend that there could be only one inhabited globe in the universe, it would be just as untenable to assert that all these worlds are or should be inhabited."*

"The opinion that the *universe* was made for man," says Viscount de Bonald, "cannot astonish a high philosophy which teaches that the material universe is only the least of the gifts that God has bestowed on man. When we reflect that the Creator of so many worlds has given Himself to us, why should we refuse to believe that He has given us His creatures. Is the work of more value than the workman?"—Catechism of Perseverance,—Gaume I, 131.

The earth, moreover, was chosen as the temporal abode of the God-man and the scene of His all-saving redemption. Hence, the conclusion that the earth alone is inhabited is, at least, tenable and plausible.

5. Catholic Astronomers

It seems to me no more than just and proper that a well-merited tribute be here paid the eminent Catholic scientists that have won renown by their astronomical studies. We find that from the most ancient times of the Chris-

* "Catholic Fortnightly Review."—XXI, 18, 561.

tian era illustrious Catholics have devoted their talents to the science of astronomy; and this, too, with more than ordinary success in solving the countless problems which are here to be met with.

If we glance over the annals of this noble branch of science, we find among the long list of Catholic astronomers a Ven. Bede (A. D. 735) who, as his learned scientific works show, was one of the very first to defend the globular form of the earth; he also held that the ebb and flow of the tides was caused by the moon; moreover, it was he that first explained the true cause of the eclipse of the sun and moon, and unveiled the superstitious vagaries of astrology.

The Abbot Alcuin (A. D. 804) was the first to boldly defend that the portentous and hitherto misunderstood movements of Mars were required by its volume and position.

Sylvester II, (who reigned as Pope from 999 to 1003), better known, perhaps, as the celebrated Gerbert, was, undoubtedly, one of the leading astronomers of his time.

Even before the invention of the telescope, Albertus Magnus, (who died in 1280), the great theologian, taught that the beautiful girdle of light which encircles the evening sky,—the Milky Way,—is a vast assemblage of stars.

Mueller of Regensburgh, better known as Regiomontanus, Bishop of Ratisbon, who lived toward the close of the fifteenth century, "was

the greatest astronomer Europe had up to that time produced."*

Pope Gregory XIII (who died in 1585) corrected the mistake of eleven minutes a year in our present calendar, and thus conferred a universal blessing on mankind.

The immortal Nicolas, of Cusa, who, two hundred years before Galileo, boldly asserted that the earth, and not the sun, was in motion, was a Catholic priest and cardinal.

Copernicus, one of the greatest astronomers that ever lived, was an ecclesiastic. He was born in 1473 and died in 1543. He dedicated his great work on the rotary motion of the earth to Pope Paul III. Copernicus is the founder of the Copernican system, which places the sun in the center, with planets revolving around it. Our admiration for the achievements of this truly great scientist is necessarily enhanced when we remember that in his time the telescope was still unknown. His observatory was the garret of a small farm-house. Forty years of incessant labor were devoted by him to the great work which immortalized his name. It consists of six volumes, and bears the title, "De Coelestium Orbium Revolutionibus." The monument that marks the resting place of Copernicus bears the suggestive epitaph: "Sta sol, ne moveare." Mr. Bayne accords Copernicus "the first place among astronomers."

* "What Catholics Have Done for Science."—Brennan, p. 11.

Galileo Galilei, born in 1564, has done more, perhaps, for the science of astronomy than any other man. Sometimes this truly great astronomer is referred to as a "martyr of science," who was persecuted by the Catholic Church, of which he was a member. And this supposed fact is alleged as a proof that the Church is opposed to science. This accusation is unjustly flaunted against the Church. If the Catholic Church were opposed to science, why is it that her enemies do not bring other instances than this solitary one of Galileo? The facts even in this isolated case are often garbled and misrepresented. Those who are desirous of securing a truthful view of the Galileo case would do well to read the pamphlet of Rev. John Gerard, S. J., entitled "Galileo," published by the Catholic Truth Society. "Galileo, and His Condemnation," by E. R. Hull, S. J., is also very good.

Again, the first to observe a transit of the planet Mercury across the disc of the sun was the Abbot Gassendi.

The Theatine Monk Piazzi enjoys the distinction of having been the first discoverer of the asteroids, or small planets.

The names of Clavius S. J., Grimaldi S. J., Boscovich S. J., Mayer S. J., De Vico, S. J., Cassini, Orioli, Picard, and Denza * are those of other Catholic priests who have won renown in the field of astronomy. These scholarly men were

* "Catholic Science and Scientists."—Zahm, p. 74.

as well versed in the science of the stars as in the science of the saints.

Pietro Angelo Secchi S. J., who died on the 26th of February, 1878, deserves an especial mention, on account of his "discoveries in spectroscopic analysis, and in stellar physics." His renowned work on the sun reflects the luster of that great luminary, as well as surrounds its learned author with a brilliant aureole.

Leverrier, too, whose amazing calculations we have just seen, was a pious Catholic, "devoted alike to crucifix and telescope," "two objects that, in his mind, were typical of what can never be too closely united." It was Leverrier, moreover, who calculated the weight of Mercury, a most difficult task owing to this planet's proximity to the sun.

Messier, "the ferret of comets," Maraldi, Castelli, Bianchini, Lacaille and Descartes likewise deserve honorable mention in this connection.

And, if we come down to our own time, we can point with pride to the Rev. Father Hagen, S. J., former Professor of Astronomy and Mathematics in Georgetown University. In April, 1906, Father Hagen was appointed Director General of the Vatican Observatory by the late Sovereign Pontiff, Pope Pius X. The "Atlas Stellarum Variabilium," "Charts of the Variable Stars," which this world-renowned astronomer has prepared, and in part published, will undoubtedly

immortalize his name. This great work represents twenty years of observation by night and calculation by day.

Miss Agnes Mary Clerke, who died in January, 1907, was a member of the Royal Astronomical Society and a devout Catholic. She has written three excellent books on astronomy, and is considered "its best modern historian." Her published works are: "Astronomy During the Nineteenth Century," "Problems on Astrophysics," and "Modern Cosmogonies."

Father Perry S. J., the late Director of Stonyhurst Observatory, has, likewise, contributed much to the advancement of astronomical knowledge.

In recognition of his contributions to various astronomical and other scientific publications, the Rev. William F. Rigge, S. J., Professor of Astronomy in Creighton University, Omaha, Nebraska, has been honored with a fellowship in the Royal Astronomical Society of England.

These are but a few of the many Catholic scholars who have gained celebrity by their astronomical researches. The Catholic Church in our own times, as well as in former times, may rightly be termed a patroness of astronomy. She today possesses more astronomical observatories than any country, or denomination, on the globe. Beginning with the Vatican Observatory, which was founded out of the private purse of the illustrious Leo XIII, of blessed

memory, we find them scattered throughout the world. The Jesuits, alone, have seventeen observatories attached to their colleges and missions.

In fact, the Catholic Church is ever ready to encourage and promote every branch of scientific knowledge. The erudite Pope Leo XIII once said in an Encyclical: "And will it be urged that the Church is systematically opposed, or cold and indifferent, to the studies and researches which yield such precious results? Or that she stubbornly insists on closing the book of Nature in order that none may read further therein? Whosoever gives credit to fancies so grotesque shows how little he knows of the flame of zeal that burns in the heart of Christ's spouse."

The farther we advance into that vast realm about us the more perfect shall be our intellectual invasion and occupancy. As yet, man's invasion of the great world above and about him has been very limited. What has thus far been discovered and explored with the telescope and spectroscope is exceedingly little compared with that which is still to be learned. Professor J. J. Thompson, the well-known physicist, candidly avows that "the sum of (scientific) knowledge is at present, at any rate, a diverging not a converging series. As we conquer peak after peak we see in front of us regions full of interest and beauty, but we do not see our goal, we do

not see the horizon; in the distance tower still higher peaks, which yield to those who ascend them still wider prospects, and deeper feelings, whose truth is emphasized by every advance in science, that 'Great are the Works of the Lord,' and greater still His love towards man."

The more thoroughly the secrets of Nature are mastered, the deeper too should be our reverence for Almighty God, by whose unfailing design all laws and all elements are moved. "Every advance, therefore, of real science, being a new evidence of man's intelligence and affording a new insight into the marvels of creation, is a cause of rejoicing for the Church." For this potent reason the Catholic Church always has been and always shall be an enthusiastic friend to science. The Catholic Church has always endeavored to perfect the bond of union which exists between Science and Religion.



Oak Tree (*Quercus Virginiana*).

CHAPTER III

THE VEGETABLE KINGDOM REFLECTS THE WISDOM OF THE CREATOR

1. Preliminary Remarks

THE visible objects of this world form two great classes, the organic or animate, and the inorganic or inanimate. All the things of this world belong to one of these two classes, which are essentially different from one another and easily distinguished. When studying their nature, we find that, under all circumstances and at all times, permanence characterizes the one kind of creatures and continual change the other. As harmonious action among its various parts is the essential mark of an object possessing life, so is permanence the essential mark of things without life.

We have briefly touched upon things devoid of life, and learned that the earth has been created and prepared to be the abode of vegetable and animal life.

Let us now turn our attention to some manifestations of this wonderful something called life.

"Wondrous truths, and manifold as wondrous,
God hath written in the stars above;
But no less in the bright flow'rets under us
Stands the revelation of His love."
—*Longfellow.*

Men of means and leisure often go to great pains and expense to see a famous work of art or architecture. We all find delight in viewing the products of human skill. Yet we easily pass by the tree, herb, and flower, without ever thinking of the great power and wisdom revealed by these works of divine skill. If in passing through a museum, moreover, our eye lights upon a beautiful painting we contemplate it with pleasure, and marvel at the artist's skill. But should we examine the work with a microscope our pleasure would at once cease. Not so with the works of God. The painting of the Divine Artificer will bear the scrutiny of the most powerful microscope. I saw a photograph a short time ago, writes Professor W. F. Watson, in Sc. Am., V-25-1901, representing a bee's sting and the point of a needle side by side. Although the bee's sting had been magnified more than the needle-point, yet "the microscopic smoothness and perfection of detail in the natural object presented a striking contrast to the clumsy workmanship exhibited in the needle, though its magnification was much less than that of the sting." In fact, the closer we examine any object of nature the more shall we find to excite

our wonder, and the more ought it prompt us to praise Him who made it. The true artist will readily admit this fact. "What is ornamental art but the isolation and embodiment in works of human skill of the beauty that is diffused through all the works of nature?" "And this beauty is as manifest in every part and atom composing the works of nature as in the combined whole."* Well, then, does the poet sing:

"Happy he who walks with God! Whom what he find
Of flavor, or of scent in fruit or flower,
Or what he views of beautiful or grand
In nature, from the broad majestic oak
To the green blade that twinkles in the sun,
Prompts with remembrance of a present God."
—*Cowper.*

2. General Morphology of Plants

Whatever possesses organic life is necessarily subject to external and internal changes. To begin to exist, to arrive at maturity, to decline, die and then decay, is the brief history of all the living creatures in this world. Unlike lifeless objects, whatever lives does so by a peculiar interior assimilation of certain particles received from its surroundings, and elaborated in a most unique manner. It is to the organic or animate class of creatures that the varied and charming objects belong which form the vegetable kingdom.

*Balfour, "Botany and Religion," pp. 401 and 402.

There is, perhaps, no science that furnishes such satisfactory and convincing evidence for the existence of an All-wise and Loving Creator as that of the vegetable kingdom. If rightly pursued, the study of botany will certainly lead one to the consoling acquisition of elevating and inspiring ideas of the power, wisdom and goodness of the Almighty. Every plant, as well as every part of a plant, is an illustration of design, and therefore a proof for the existence of a Benevolent God.

In our treatment of this delightful subject, we shall observe the natural order, and rise from the lesser to the greater.

What wonders are to be met with at the very entrance to this sanctuary of the Most High! Though we but superficially examine a plant, we shall find that each portion, or member of its organism, its root, stem, leaf, flower, and seed,—reveals a world of wonders. We shall soon discover, too, that every plant, both in its entirety and in its individual members, is under the dominion of fixed and unalterable laws. And according to the external manifestations of these universal laws which govern the vegetable kingdom, each and every plant can be brought under a certain genus and species.

A most remarkable economy reveals itself in the very origin of plants.

The seeds of cereals, as, for instance, those of wheat, oats, corn, and the like, consist chiefly

of a nutritious matter, which, when surrounded by moist soil, swell and undergo solution. If sufficient soil and moisture surround the transformed seed, it will in due time develop a germ, then sprout, and finally send a small root into the ground.

And what ingenious contrivances do we not find to fix the seed into the soil. The seed of some kinds of plants, as of Collomia, are surrounded by a network of fibres, which, when moistened, uncoils in a spiral manner and thus bore the seed into the ground.

As soon as a seed becomes furnished with roots and is firmly fixed in the soil, the extracting of nourishing fluids from mother earth begins. These fluids, in turn, ascend upward and are transformed into cells; the cells, endowed with vitality by the Creator, now begin to multiply and to send forth stem, branches and leaves, or their equivalent. As soon as the nutritious sap, which is extracted from the soil and drawn to the leaves by capillary attraction, reaches the extreme portions of the plant, it is there subjected to the action of heat, air and sunlight; these change the sap into various solid substances, which are destined to give firmness and solidity to the plant according to its nature. When the stem and branches are produced, there begins a beautiful interchange of services between the various parts of the individual organism.

A. The Stem

Scarcely has a plant attained to the dignity of an individual, when we can observe a continual harmony of action in all its parts. If we examine the stem, whose purpose is to convey nourishment and to support the leaves, we find that it possesses a most marvelous regularity of structure. The kind of stem depends on the kind of seed from which the plant springs. "Thus, dicotyledon seeds have exogenous stems, monocotyledons have endogenous stems, and acotyledons have acrogenous stems, or such stems as increase by additions secreted chiefly without, within, or at the summit of the stem." There is a surprising coöperation observable among the cells, which build up the stem of a plant. "The nourishment, extracted from the soil, in its upward course passes chiefly through the internal parts of the stems, being moved onwards by the force of imbibation and by capillary attraction, as modified by vital actions. When it has reached the leaves and undergone certain changes, it returns toward the bark" and is there deposited in the form of hard substances. The permanent woody stems, with their pith, concentric rings, cellular and fibrous bark, present an immense variety of structure. And how naturally does not the stem adapt itself to its immediate surroundings! Some plants, too weak to support themselves, send their stems

around the nearest object and thus become dependent on the same for growth, support and development. Of this class we discern some, like "the Passion flower and French bean, invariably twine their stems from right to left"; others again, like the hop and honeysuckle, "always twine their stems in the contrary direction, i. e., from left to right."

B. The Leaf

How interesting, too, is the structure of the leaf with its cells, veins, arteries, and fascinating forms and colors! The leaf of a plant keeps it in touch with the earth and air. Its chief function is to expose the sap to the action of the sun and atmosphere. The veins of the leaf are the channels through which the upbuilding juices of a plant flow. In the leaf this nutrition is then divided. In its downward course the strength-giving aliment is then deposited into the wood of the stem and bark, thus forming at the same time a protection for the more tender portions of the individual. Through the leaf, too, the superfluous fluids are exhaled, and the CO_2, (carbonic acid gas), necessary for its growth, taken up. Thus the leaves of a plant may be appropriately termed its lungs. They play a most important part in the economy of nature. For on the one hand, they inhale the poisonous gases constantly given off by man and beast, and on the other they cool the atmosphere

and fill it with the vapors that fall again in the fructifying dew or rain.

There is an almost countless variety of leaves, both as to form and color. The Sarracenia, e. g., of our swamps, and the Nepenthes, of East India, produce leaves that have the shape of a pitcher. "An East India pitcher-plant, called Dischidia Rafflesiana, climbs to the top of lofty trees and produces pitchers only among the upper leaves. There it is that the plant sends out little rootlets which enter the pitchers and derive nourishment from the rain and dew which are thus collected."

The leaves of various plants exhibit a peculiar sensitiveness. Some, e. g., contract and close at dusk; others, like the Porliera hygrometrica, at the approach of rain. A most remarkable leaf is that of the plant called Venus's Fly-trap, (Dionæa muscipula), which grows in our marshes. This peculiar plant has a leaf, each side of which is furnished with three small hairs; the moment one of these leaves is touched by a fly or insect lighting upon it the leaf closes and entraps its victim. Its vicious nature has obtained for the Dionæa the name "carnivorous plant." As soon as the leaflets of the Mimosa pudica, another species of sensitive plants, is touched, they immediately shrink together. The leaves of the Desmodium, or Moving plant, of India, are in constant motion both day and night; the leaves that lie opposite each other on

the stem alternately come together and separate again.

Yet in spite of the many peculiarities and well-nigh endless variety of leaves, we find that they are all governed by fixed laws, which regulate their form as well as their function. Intended order is discernible not only in the individual plant, but also in all its parts. Design is unmistakable, says Professor Asa Gray, even in the position of a plant's leaves. Mr. Gray proves his assertion by a large number of instances. And Professor Agassiz calls attention to a remarkable coincidence between the fractions expressing leaf arrangement and the fractions which express the time in which the principal planets encircle the sun; whereupon, he draws this reflection: "Whence this strange simplicity? How can it be accounted for except by the fact that the same Hand adjusted the blades of grass which sets in motion the orbs of the universe?"

C. The Flower

HYMN TO THE FLOWERS

Day Stars! That ope your eyes with morn to twinkle
From rainbow galaxies of earth's creation,
And dewdrops on her lovely altars sprinkle
As a libation!

Ye matin worshippers! who, bending lowly
Before the uprisen sun, God's lidless eye,
Throw from your chalices a sweet and holy
Incense on high!

'Neath cloistered boughs each floral bell that swingeth,
And tolls its perfume on the passing air,
Makes Sabbath in the fields, and ever ringeth
A call to prayer!

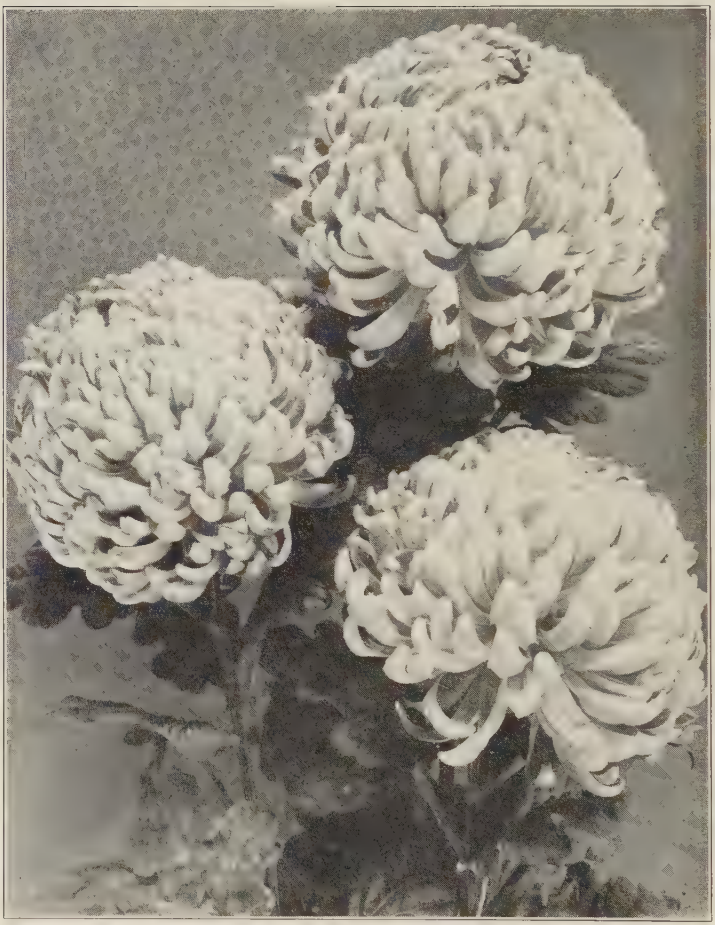
Floral Apostles! that in dewy splendor,
"Weep without woe, and blush without a crime,"
Oh, may I deeply learn, and ne'er surrender,
Your lore sublime!

"Thou wert not, Solomon, in all thy glory,
Array'd," the lilies cry, "in robes like ours;
How vain your grandeur! ah, how transitory,
Are human flowers!"

Not useless are ye, Flowers! though made for pleasure,
Blooming o'er field and wave, by day and night,
From every source your sanction bids me treasure
Harmless delight.

Ephemeral sages! what instructors hoary
For such a world of thought could furnish scope?
Each fading calyx a "memento mori,"
Yet fount of Hope!

Posthumous glories! angel-like collection!
Upraised from seed or bulb interr'd in earth,
Ye are to me a type of Resurrection,
A second birth!



CHRYSANTHEMUMS.

Were I, O God! in churchless lands remaining,
Far from all voice of teachers or divines,
My soul would find in Flowers of Thy ordaining,
Priests, sermons, shrines!

—*H. Smith.*

The root, stem and leaves of a plant constitute its organs of nourishment. Whether considered by themselves or in their relations to one another, each organic part of a plant exhibits intended order, or design. In no one part of a plant, however, is design more apparent than in its flower, which Linnæus calls its nuptial dress. The form, shade, and color of flowers border on the infinite. Every season, month, week, year, yea every hour, seems to have its own peculiar flowers, which succeed one another in charming variety. Each island and country, too, can boast its own flora. Some flowers exhibit regular diurnal periods of expansion and closing. "On this principle, the great Linnæus constructed what he called a floral clock, in which each hour was marked by the opening of some flower."

When contemplating this achievement, how true to nature the lines of the poet appear:

"In every copse and sheltered dell,
Unveiled to the observant eye,
Are faithful monitors, who tell
How pass the hours and seasons by.

And in each flower and simple bell
That in our path betrodden lie
Are sweet remembrancers, who tell
How fast the winged moments fly."

The corolla of the flower is the depository of its colors, and, consequently, is of countless form, color and tint. Among the more peculiar corollas we find some having the appearance of bees, spiders, butterflies, etc. Hence, the names "Oncidium papillio," butterfly-plant, "Aceras authropophora," man-orchis, "Flor de mosquito," mosquito-flower, etc. When viewed under a microscope the petals forming the corolla are highly interesting. The petals usually contain in their tiny little cells the coloring matter of the flower. The three primary colors,—red, yellow and blue,—predominate, and are commonly present in some part or other of every flower.

In the bright colors and delicate shades of flowers we easily recognize the consummate skill of the Divine Artificer. "Whether blended or separated," as Thornton aptly remarks, "the colors of the flower are evidently under the control of a taste which never falls short of the perfection of elegance. The Creator has added to them the charms of an endless novelty to please the eye and to contribute to the enjoyment of man." There is not a flower "But shows some touch, in freckle, streak, or stain of God's unrivaled pencil."

When in quest of a design to exhibit his ornamental skill the artist can do no better than attend the school of nature. Forms more elegant cannot be found anywhere in the universe, nor colors more exquisitely combined. Mr. Crabbe well says that "the real genius in the art of designing does not puzzle his brain to invent strange forms to transfer to the fabric of the loom; he studies nature on the heath, in the field, the hedgerow, the garden, and the conservatory, and endeavors to combine the natural beauties which delight the eye and please the taste."

"Art is the child of Nature: yes,
Her darling child, in whom we trace
The features of the mother's face,
Her aspect and her attitude,
All her majestic loveliness
Chastened, and softened, and subdued
With a more attractive grace,
And with a human sense imbued.
He is the greatest artist then,
Whether of pencil, or of pen,
Who follows nature. Never man,
As artist or as artisan,
Pursuing his own fantasies,
Can touch the human heart, or please
Or satisfy our nobler needs,
As he who sets his willing feet
In Natures footprints, light and fleet,
And follows where She leads."

The odors of a flower bear a close relation to its colors. The odors as well as the colors

of a flower commonly reside in the petals of the corolla. "They are owing to volatile matters, which are not easily detected; subtile particles of them are diffused through the air in a way which eludes the researches of man."

In contemplating flowers the thoughtful observer will invariably exclaim with Cowper: It is God who inspires

> "Their balmy odours and imparts their hues,
> And bathes their eyes with nectar, and includes
> In grains as countless as the sea-side sands
> The forms with which he sprinkles all the earth."

3. The Preservation and Propagation of the Species

Perhaps nowhere in the vegetable kingdom is design more apparent than in the production, preservation and propagation of the species.

As soon as a plant has reached maturity in its various members the function of reproduction begins. All the various parts of the organism coöperate in this important work. Each portion of the individual contributes its mite for the good of the species, and shares in the work of reproducing its like or kind. The seed or principle of life of the new plant is usually developed within the pistil, and attached to the edge of the carpels surrounding it.

It is actually amazing what a large number of seeds some plants produce: "The tobacco

plant, for instance, has 40,000 or more seeds to a stalk; burdock, about 60,000 to a single stalk, whilst the common red poppy has about 50,000 seeds." "In the case of the lower tribes of plants, as mushrooms, puffballs, etc., the number of seeds is almost incredible. In a single plant of this tribe Fries ascertained the existence of ten millions which were so minute as to be scarcely visible."

At no time during its development is the seed exposed to the inclemency of the weather. The manner of protecting their seed is quite distinct and peculiar to the various kinds of plants.

"In the pea tribe the seeds are regularly disposed in parchment pods, which, though soft and membranous, completely exclude the wet, even in the heaviest rains. The pod, also, not seldom, as in the bean, is lined with a fine down. At other times, as in the senna, the pods containing the seeds are distended like an inflated bladder. Often the seed is enveloped in wool, as in the cotton plant, or lodged, as in pines, between the hard and compact scales of the cones. Again, we find the seeds barricaded, as in the artichoke and thistle, with spikes and prickles; in the mushroom they are placed under a penthouse; in ferns, within slits in the back part of the leaf. Or, which is the most general organization of all, we find the seeds covered by strong, close tunicles, and attached to the stem according to an order appropriated

to each plant, as is seen in the several kinds of grains and grasses." Natural Theology, Paley, p. 231. In this arrangement a unity of purpose and wise means to attain the same cannot escape the intelligent observer. "Nothing can be more single than this purpose, nor anything more diversified than the means employed to attain it. The purpose is the preservation of the seed; the means employed to attain this end are pellicals, pods, pulps, husks, skin, scales armed with thorns, and a variety of hulls, shells, etc."—Ibid.

After a plant has successfully brought its seed to maturity, its next care is to propagate the same. To bring about the propagation of the seed, nature avails itself of various agencies. The wind, the elasticity, or irritability of the plant itself, and insects are the usual means of distributing the seed or pollen. Bees do much in fructifying plants by unwittingly distributing the pollen on their pilfering expeditions after food for their young. In each case the pollen, or fine seed, must be brought into connection with the pistil, else there will be no fertilization. "In the case of hazel, willows, etc., the stamen-bearing and pistil-bearing flowers are on different parts of the same tree or plant." In such cases fertilization is commonly brought about by the wind.

"In Vallisneria spiralis, an aquatic plant, which grows in the mud of ditches in Southern Europe, the flower of the stamen-bearing plant

at a certain period detaches itself and rises to the surface of the water, where it floats and ripens its pollen. Soon after this, the pistil-bearing plant, which still remains growing in the mud, sends up a long spiral stalk, which bears the flower to the surface where it expands. The pollen is then wafted on it, by the wind, and the seed is perfected, and finally deposited in the mud."

Some species of fungi, for instance Ascobulus, are propagated by means of tiny spores. I examined a specimen of fungus, which grows on cow-dung, under a powerful microscope. After coating the fungus with iodine, hundreds of little spores became visible nicely imbedded in rows of eight seeds. When sufficiently developed these minute cells, or seeds, are scattered in every direction by the bursting pods. By the contraction and sudden expansion of the tiny fibres, which contained them, the seeds are thrown a distance of nine centimetres. What a tremendous energy is here revealed by these insignificant little fungi. Were the muscles in man's limbs proportionately strong and elastic, it is said that he could easily leap a distance of one mile.

The process of propagation everywhere observable in the vegetable kingdom is a patent contradiction to the theory of the "survival of the fittest." Every species of plant, yea, each organ or part of the fully developed member of

a species, seems to be solely occupied in propagating its kind. Were there a tendency in the vegetable world to diminish the number of individuals "to the fittest," the lavish production and distribution of seed everywhere discernible could not be explained.

And let him who denies the existence of an intended order, or design, which governs the entire vegetable kingdom, explain why it is that the same kind of seed always produces the same kind of plant, tree, or flower. An acorn will never produce a cherry tree. Growing side by side an oak, elm, beech, peach tree, rose bush, etc., will each assimilate those particular elements from the soil and atmosphere which are adapted to its own peculiar nature. A pine will remain a pine tree, and the rose will never become a lily. What is the cause of this wonderful selection and assimilation of mineral substances observable throughout the world of vegetable life?

Were a person to find a beautifully trimmed lady's hat lying on a lawn, the thought would never occur to him, provided he be of sane mind, that the elements of the hat were jostled together by chance and thus obtained the particular form and appearance which they now have. Or that it may, perchance, have grown out of the ground! Would not every intelligent person think that the hat was made and trimmed by a human being? Likewise will

every one, who has a sane mind, when observing the natural flowers, or fruits, of which those on the hat are but a poor imitation, conclude that they have been made, or created, by a Divine Being. Both works suppose some one who designed and made them.

No matter what aspect we take of the vegetable kingdom, whether we view it in detail or in its entirety, we can easily discern a wise and well-ordered design. The conclusion, then, forces itself upon us that the herbs, plants, trees, and flowers were created. That every genus and species of the vegetable kingdom was created by an All-wise and Benevolent Creator is a truth that no sane man can deny.

"Yea! Nature is God's shadow, and how bright
Must that face be which such a shadow casts?
We walk within it, for "we live and move
And have our being" in His ev'rywhere.
The tiniest grain of sand on ocean's shore
Entemples Him; the fragrance of the rose
Folds him around as blessed incense folds
The altars of His Christ: yet some will walk
Along the temple's wondrous vestibule
And look on it and admire—yet enter not
To find within the Presence, and the Light
Which sheds its rays on all that is without."
"The Seen and the Unseen."—*Father Ryan.*

A lecture held by Professor John H. Schaffner, A. M., M. S., in 1914, on "The Contribution to a Knowledge of God from a Study of the Plants" proves the formal order observable in

the vegetable kingdom beyond all doubt. The lecture never appeared in print, but the author kindly sent me an extract, parts of which I here quote:

"The plant kingdom represents a remarkable and orderly progression from the lowest forms to the highest."

"From the standpoint of the plant this progression has been such that at the end we have plants that can take possession of the earth. These plants are preëminently the food plants of the world. Plants produce all the food in the world."

"After the development of our modern plants in the cretaceous period there appeared in great numbers birds, mammals, and man,—the final creation. . . . Thus the plant kingdom culminated in a form that was successful from the standpoint of the higher animal and man."

"There are just two modes of thought," continues the learned Professor of Botany, "in respect to the universe. The theistic and the anarchistic. A man must either believe that the things he apprehends are from God, or that everything is anarchistic. If the latter, then our political anarchists have the true views of life and existence."

"Materialism is, likewise, unsound, since, if it admits a deity at all, it postulates a multitude of gods, instead of one God. But we could only believe in a multitude of gods if the world were

found to be anarchistic. Otherwise there would still have to be a higher power to have all the theoretical atoms work in harmony."

"Therefore, the theistic conception is the only reasonable basis of belief for a normal, intelligent mind. But this belief could not be monistic. Man is a self-conscious personality, and his Creator must have the same attributes."

"The definite progress of development of plants, the order and principle, the wonderful system of plant relationship, lead but to one inevitable conclusion,—cause, effect, principle, law, God. To see this relation one must study plants in a thorough way. . . . And he who does this will be far away from the raving of some inferior or ignorant mind that conceives a tissue of falsehood and presents it to us in the name of science or philosophy. . . . Plants, moreover, do not allow us to take a purely utilitarian view of creation or the Creator. God has a thousand purposes that we have never discovered."

"There is a 'oneness' in the universe in general and in the kingdom of plants. A cosmos, and not a chaos, as an anarchistic materialistic philosophy implies. This harmonious kingdom of living plants is what I can see after twenty-five years of study."—(Extracts from a letter, dated April 15, 1914, to the author.)

The duration of a plant's life is a subject of no less interest than its development and prop-

agation. Some plants wither and die after they have flowered and borne fruit for the first time. The life period of plants ranges from a few days to many years, and even centuries. Among the species of larger plants, or trees, there are not a few that live to be many hundreds of years old. Thus the elm tree, under favorable circumstances, attains an age of over three hundred years, the chestnut (castanea vesca) about six hundred years, and the oak over one thousand years. Among the more common trees the lime, or linden, is one of the longest lived. "At Daundorf, near Baireuth, is a linden tree whose age is given as more than twelve centuries. On a map, dated 1390, it is mentioned as a 'very old tree, twenty-four yards in circumference.' There is a yew tree (Salisburiana adiantrafolia) of immense size near KueChon in southeastern Shantung, China, which is said to be about four thousand years old. Tradition says that Confucius, the great Chinese philosopher who lived about four hundred years before Christ, was wont to rest in its shade."* It is not unusual for the Taxodium distichum and the Boabad (Adansonia digitata) to live from three thousand to five thousand years. "It has been supposed that certain trees now existing on the earth may have been coeval with the creation of man."

Those trees which live longest commonly at-

* "Scientific American."—VIII-3-'01.

tain, also, the greatest dimensions of their species or kind. Some of the stately pines in Mariposa Grove, California, are over three hundred feet high, and have more than three hundred concentric circles, and a circumference of over ninety feet. "One of these gigantic monarchs of the forest primeval has been named 'General Grant,' and is conceded to be one of the largest trees in the world. It is thirty-four and one-half feet in diameter at its base, and rivals the eucalypti of Australia in height." "The largest tree in the world is supposed to be one standing on the Government Reserve in Central California; it measures fifty feet in diameter, and one hundred and fifty feet and eight inches in circumference six feet from the ground."

4. The Constituent Simplicity and Amazing Variety of the Vegetable Kingdom

Again, what an infinite number of combinations do we not find, at the very outset, of the comparatively few elements which constitute the material portion of plant life! What an artistic combination and structure of cells! Not more than twenty of the seventy-five or more known elements are to be found among the ingredients of the almost countless variety of flowers, herbs and trees. Scarcely anywhere in nature is a greater multiplicity in simplicity discernible than in the vegetable kingdom.

Whether the chemist examine the tiny lichen, or a portion of a giant Wellingtonia, a tree that sometimes grows to be ninety feet in circumference, whether the modest little violet by the wayside, or the Rafflesia of Sumatra, whose flower has obtained the astonishing size of nine feet in diameter, he will not discover more than about fifteen elements. And yet, in spite of the small number of elements constituting the vegetable kingdom, botanists tell us that "there are about 140,000 known species of plants on the earth." Whether we examine the tiniest flower, moreover, or a gigantic tree, we find that in each case the organic structure is such as makes it superior to the most exquisite works of human skill.

5. The Use and Misuse of Plants

A. The Use of Plants

Every species, as well as every individual member of each species, of the vegetable world has a place and purpose in the economy of nature. The end and object of the vegetable kingdom is, of course, to raise men's minds and hearts in humble reverence to their sovereign King:

> "On every herb o'er which we tread
> Are written words which, rightly read,
> Will lead us from earth's fragrant sod,
> To hope, and holiness, and God."
>
> —*Allan Cunningham.*

Aside from this purpose the well-nigh infinite variety of plants, shrubs, trees and flowers are created for man's use and comfort. And it is, indeed, amazing to learn the many uses to which one and the same species are often put. Humboldt tells us that "certain species of palm yield wine, oil, wax, flour, sugar, thread, utensils, weapons, food and habitations." And according to Kidder and Fletcher, in their "History of Brazil," the palm of that country "furnishes the Amazonian Indians with almost every necessity of life except flesh." Owing to their stately beauty, as well as their varied usefulness, Linné calls the palm "the prince of the vegetable kingdom."

Mr. Balfour tells us that the cocoanut palm of the Pacific Islands furnishes the natives "food, drink, clothing, building material, kitchen utensils, mats, cordage, oil and fish lines."* The cereals of the Temperate Zones are perhaps the most useful to the human family. We can hardly conceive it possible to get along without the more common ones. How sadly, for example, would we not miss Indian corn. It is estimated that the annual crop of this cereal alone here in the United States "amounts to two billion dollars."† The whole plant is used, and is said to yield about one hundred and fifty products. Moreover, every climate, as

*"Botany and Religion," p. 14.
†"America," No. 26, X-9-'09.

well-nigh every country, possesses plants which grow nowhere else. The cold north as well as the sunny south, the lofty peaks as well as the valley, the deep sea and the stagnant pool or meandering brook, has each its peculiar vegetation. No plant is an absolute cosmopolite. "Everywhere," writes Humboldt, "man finds some plants to minister to his support and enjoyment." A large number are solely for man's enjoyment:

God might have bade the earth bring forth
Enough for great and small,
The oak tree and the cedar tree,
Without a flower at all.
We might have had enough, enough
For every want of ours,
For luxury, medicine, and toil,
And yet have had no flowers.

The one within the mountain mine
Requireth none to grow;
Nor doth it need the lotus flower
To make the river flow.
The clouds might give abundant rain,
The nightly dews might fall,
And the herb that keepeth life in man
Might yet have drunk them all.

Then wherefore, wherefore were they made,
All dyed with rainbow light,
All fashioned with supremest grace,
Upspringing day and night:—



COTTON.

Springing in valleys green and low,
And on the mountains high,
And in the silent wilderness
Where no man passes by?

Our outward life requires them not—
Then wherefore had they birth?
To minister delight to man,
To beautify the earth;
To comfort man, to whisper hope,
Whene'er his faith is dim;
For Whoso careth for the flowers
Will much more care for him!

—*Mary Howitt.*

Henry Grady, the once noted editor and orator of the South, paid the following eloquent tribute to cotton: "Cotton! What a word to conjure with to us who are from the South. What a royal plant it is! The world waits in attendance on its growth. The shower that falls whispering on its leaves is heard around the earth. The sun that shines upon it is tempered by the prayers of all people. The frost that chills it, and the dew that descends from the stars are noted, and the trespass of a little worm on its green leaf is more to England than the advance of the Russian army on her Asian outposts. It is gold from the instant it puts forth its tiny shoot. Its fiber is current in every bank; and when loosing its fleece to the sun it floats a sunny banner that glorifies the field of the humble farmer; it is marshaled under a flag that will compel the allegiance of the world and

wring a subsidy from every nation of the earth. It is the heritage that God gave to this people forever as their own when He arched our skies, established our mountains, girt us about with the ocean, loosed the breezes, tempered the sunshine and measured the rain. Ours and our children's forever. As princely a talent as ever came from His hand to mortal stewardship."*

B. Misuse of Plant Life and Forest Conservation

Since the manifold kinds of plants have been created to serve a certain purpose, it is man's duty to prevent, as far as he is able, this purpose from being frustrated. When the use for which the Creator has intended the various species of plants is wilfully and maliciously made impossible, he who does this is guilty of an abuse, and also a wrong against the Creator. Among uncivilized nations we frequently find various idolatrous notions and practices connected with plant life. To the untutored or irreligious mind the dense forest and impenetrable thicket has ever been the abode of the powers of darkness.

In Annam, for example, the poor deluded native looks upon trees as the abiding places of spirits, and pays them reverence. "The religious trees are usually of luxuriant foliage. There, says a popular tradition, reside female spirits, the bon Tinh, or souls of young girls who died

* "The Miner's Magazine."—May 1, 1913.

before marriage. Woe to the young man who passes too near such a tree. The bon Tinh will endeavor to seize his soul, that dying, he may espouse her in the future life."*

"A gigantic fern of the Annam forests grows to an immense height and spreads out its leaves like an enormous umbrella. On account of its remarkable form, it is considered the abode of a spirit, and is called the hop ma (demon's shade). When the natives come upon this mighty plant they respectfully turn away their gaze, believing that few can look upon it without incurring the demon's wrath. The bark and leaves of certain trees are used for the purposes of magic in Annam. Trees are venerated by these people on account of some natural beauty such as great height, abundant foliage, age, or peculiarity of form."

A western lumberman was asked some years ago the secret of his great financial success. "I frankly admit that I became rich by robbing children still unborn." The man meant exactly what he said. For many years he had been preying on future generations. The company, of which he was the acknowledged head, had made it a practice to level forests without any provision for future growth. Their sole object was present gain. "To steal from living grown-up people, nowadays, is not an easy task," this man pursued, "but I find it quite simple to

* "Catholic Missions."—Vol. VI, 4, 82, Rev. L. Cadiere, P. F. M.

steal from infants not yet born." Thanks for your frankness! Yet, to strip timber from our mountain sides and plains, without leaving seeds and saplings for the coming years, is paramount to stealing from future generations. Aside from the detrimental effects it has on the climate such a practice will reduce the rainfall of a district, fill up its rivers and creeks with the soil of their banks, and ultimately retard, if not destroy, vegetation. The Austrian law which obliges him who fells a tree to plant another within a year is a wise provision. Moreover, it were well if we had forest inspectors who would, in some way, prevent the wholesale leveling of our forests. It would be well worth the while to mark those trees which may be cut down without detriment to a forest, and to make it illegal to fell the others without a special permit.

It is a healthful sign pointing to continued material prosperity that forest conservation is becoming a vital issue throughout the length and breadth of the land. "A very few years ago forest conservation was little more than a phrase; today it is a vital issue in our national development," says Treadwell Cleveland, Jr., in a circular which has been issued by the United States Forest Service, from which I here quote: "In connection with the general plan to conserve all natural resources, the circular is the most important and far-reaching economic

policy ever adopted and pursued by any nation."

"The forest is one of the chief supports of the whole material fabric of civilization. The forest means not only a permanent supply of wood and the life of all the industries which depend upon it, but also the control of the waters for human use. There is only barrenness in the future of the nation which has lost the use of wood and the control of water."

"The sort of use that was made of natural resources during the pioneering stage, while right enough at the time, is far too wasteful to be carried on into the new industrial era. In order to know how to use a thing, however, it is necessary first to find out how much of it there is to use, and taking stock of our forest resources has led to startling results."

"It has shown that we are still destroying the forest as we use it; that we are taking from it every year three and a half times as much wood as is added by the new growth. It has shown that less than one-third of the growing trees felled by the lumbermen is ever used at all, so that two-thirds of all the timber cut is simply destroyed. It has shown that one-eleventh of all the forests are swept by fires every year, and that on the average since 1870 forest fires have yearly cost $50,000,000 in timber, and fifty lives. It has shown that over ninety-nine per cent of the forests in private

hands is thus devastated by destructive use and the scourge of unchecked fires, whilst less than one per cent is properly handled for successive crops, or effectively protected from fire. The forest as a resource is rapidly being obliterated."

"But the inventory of the forests has had yet other ugly facts to reveal. With the disappearance and deterioration of the mountain forests the nation is losing control of the streams, which are useful in our civilization in ways and degrees unparalleled by any other resource. Pure water for domestic purposes is, of course, indispensable; usable water at the right seasons is the sole reliance of the great projects by which the arid lands are vivified by irrigation; cheap water transportation is a matter of dollars and cents to every citizen; trustworthy power streams are the key to the age of electricity, at the gates of which modern industry is standing. Yet the guardian of the waters is steadily compelled to retreat before the axe and fire."

The late floods, too, in Ohio, Indiana, and along the Mississippi River, ought to be a lesson for legislators in Forest Conservation.

"It is not use that destroys the forests, but waste. Not use as such but destructive use, combined with inexcusable neglect, is causing the forests to dwindle under our progressive demands upon them. The problem, therefore,

is not to be solved by disuse, but by wise use and protection. These together will so stimulate forest growth that the needed wood may be harvested without depleting the stock on hand, and will keep intact the protective cover at the stream sources."

Several European countries teach the world a lesson of political economy with regard to forest conservation. For instance, "the community of Orsa, in Sweden, has in the course of a generation sold $4,600,000 worth of trees; and by means of judicious replanting has provided for a similar income every thirty or forty years. In consequence of this commercial wealth there are no taxes. Railways, telephones, etc., are free, and so are school houses, teaching, and many other things." Thus, this modern Utopia owes its flourishing condition largely to the vegetable kingdom.

Whatever tends to develop and conserve our forests ought to receive the hearty support of every American citizen. A work deserving of the highest commendation is that of the Office of Forest Pathology. "The United States Office of Forest Pathology deserves great praise for its excellent work in forest conservation," writes the Toledo Blade in an editorial, Sept. 10, 1913. "In the bureau known as the Office of Forest Pathology the government maintains an institution which is doing work which will entitle it to the gratitude of generations unborn.

It is the special duty of this office to study the diseases of trees and find how they may be controlled or altogether eliminated."

"A few years ago, a blight appeared among chestnut trees which threatened to render this species extinct on the American continent. The office of Forest Pathology has found the way by which the blight can be quarantined and kept within the district now affected until it is destroyed. Another disease, the white pine blister rust, was imported from Europe and found its way into the nurseries of six states. The government agents are tracing the plants that were sold and, wherever they find them, are seeing that they are destroyed, to the end that the disease may be completely conquered. Young cone-bearing trees, under artificial conditions, have had an inexplicable way of bending over and dying. The pathologists learned that this could be overcome by a simple treatment of the soil." Thanks to such endeavor, forest conservation is no longer a theory or a mere doctrine. It is a policy in force.

C. Coal

The relation which the vegetable kingdom bears to coal is a most intimate one. Vegetable life, in all its various forms, assimilates the gases of the surrounding air and the mineral substances of the soil. The individual plant, like a skilled chemist, draws what is congenial

to it under its influence, and mixes it into a sap, from which it forms its stem, leaf, bud and fruit. Its one endeavor is to reach the perfection of its kind or species. Even though its longevity be thousands of years, sooner or later it must succumb to the inevitable and die.

At death, however, the plant, herb and tree bequeath their accumulated treasure to the mineral kingdom, which, under favorable conditions, converts the inheritance into coal. Thus any kind of wood can become wood-coal by parting with its oxygen in the form of carbonic acid gas, or choke-damp; if, in addition, it also loses its hydrogen, it becomes common or bituminous coal; and "the more hydrogen it gives off, the nearer it approaches to the state of anthracite, or hard coal. Further, if anthracite coal loses all save its last atoms of O. H. and N. we have graphite (blacklead). Having once attained this state it needs only perfect purification and crystallization to become a diamond." The coal we use is, therefore, a middle term of a series of transformations between live wood and the diamond. Judging from the steadily increasing price of coal it would seem that this transformation of coal into diamond is progressing rapidly, at least in the minds of some of our coal barons.

But how is the distribution, or deposition, of coal explained? In all probability the greater portion of the coal now in existence has been

formed out of the vegetation which once grew where the coal is now found. This explanation is called "the formation process." The best evidence that coal has been formed out of growing vegetation where it lies buried is the "fact that very often one coal-seam is found below the other for many hundreds of feet beneath the earth's surface, and each seam has its under-bed of clay." One forest of growing vegetation, therefore, must have been sunk by an earthquake, or some other violent shock, and buried, before another forest could grow and furnish material for the next seam of coal. In one of the mines in the Rocky Mountains there are over thirty strata of coal, each having its under-seam of clay. This means nothing else than thirty earthquakes, or subsidences of land with their forests, or peat-moss.

Such subsidences are not infrequent even in our time. "In the year 1819, in India," according to Sir C. Lyell, "a single earthquake sunk a tract of land larger than Lake Geneva to a depth of eighteen feet and converted it into an inland sea. The same shock raised a corresponding stretch of land, a few miles off, ten feet above the alluvial plain."

A similar phenomenon occurred in the Mississippi Valley during the earthquake of 1811 in what is called the "Sunk Country." Such shocks were undoubtedly more frequent in ancient times when vegetation was likewise far more exuberant than now.

Another explanation for the distribution of coal-beds is that the forests which provided them with the necessary material were deposited by rivers which carried the same into their deltas. This theory, however, supposes an immense period of time, as well as great changes in the earth's surface.

According to quite a number of scientists the formation and distribution of coal are explained in this manner: In former ages when forests grew more rapidly than now, vegetation was most exuberant along the banks of seas and lakes; and when this vegetation grew out into a bed of water and became too heavy to be borne by it, it broke off and sunk to the bottom of the water; this layer was then buried before another had a chance to grow and fall above it, to be buried in the same manner. This process I myself had the opportunity of witnessing on a small scale in Southern Holland, near the village of Exaeten.

But what about the coal supply? In a lecture before the National Geographical Society, Professor C. D. Walcot, Director of the U. S. Geological Survey, said "that the anthracite coal fields of the U. S. would be exhausted, at the present rate of consumption, in sixty years, and that by the year 2203 the bituminous coal fields will also be worked out. After that this country will be compelled to secure its fuel supply from the lignite beds of the west." I sup-

pose when this time comes, and not till then, shall smoke inspectors be able to boast that they have successfully reformed factory and brewery chimneys.

But who knows, perhaps changes no less great will take place in the mineral world than have arisen in the social world regarding the use of coal. Does it not seem strange that as late as the year 1316 the combustion of coal was restricted by law in London, England, because it was considered unhealthy?

Coal is, then, one of the last links in a wonderful series of transformation from growing vegetation. The incipient plant, exultant in its youthful vigor, weds the sunbeam at sight. Together, sunbeam and plant, weave for years and years from morn till night. The garment they weave, though laid aside when life's task is done, is not destroyed. The pent-up ray, invisible, yet mighty, awaits the day when it may cheer the sitting-room or propel the locomotive. Shut up behind the prison bars of coal, the captive sunbeam patiently awaits its day of deliverance. The coal is dug and ignited; as soon as an atom of it can combine with oxygen, the prisoner is again released. The consumption to ashes of one pound of coal requires the oxygen contained in 150 cubic feet of air. As if awaking to life and to a sense of its former power, it seizes hold of every atom of oxygen in reach and spends itself in the service of man. The



The Passion Flower

golden beam now leaps from its prison in the form of light and heat, once more assuming the nature it possessed when it entered the growing leaf and stem many ages ago.

6. Botany and Religion

Every individual member of the vegetable kingdom loudly proclaims the existence of a Creator. Man may be able to unite the same elements that are found in a plant, and perhaps in the same form, but he can never unite them so as to produce a seed or a plant that will *grow.* The vital principle with its peculiar properties and energy comes from God, by creation. He it was who said in the beginning, "Let the earth bring forth grass, the herb yielding seed, and the fruit tree yielding fruit after its kind."—Gen. 1:11. And whether we study the nature of the blade of grass or the mighty oak, we always and everywhere hear the sweet echo of that commanding voice of our Heavenly Father ringing in our ears. "A blade of grass," says Dr. Brown, "imbibes the moisture of the earth, inhales the fixed air and the ammonia of the atmosphere, and weaves its own expanding form, with all its delicate organs and their susceptibilities, out of their dismembered parts."* Could any man, or any number of men, produce something of the kind that would thus begin

*Balfour, p. 398.

to grow and live by drawing on the various realms of nature?

Again, every tree furnishes a striking example of the economy of nature, and easily leads the observer to the certain knowledge of nature's All-wise Author. The roots of a tree, under normal circumstances, fix themselves firmly into the ground in exact proportion to its growth above ground. The lateral extension of the roots, moreover, has a constant relation to the horizontal spreading of the branches, so that the rain falling from the edge of the latter is absorbed by the tender tips of the roots. "We have here," says Roget, "a striking instance of that beautiful correspondence which has been established between processes belonging to different departments of nature, and which are made to concur with such remote effects as could never have been accomplished without these preconceived and harmonious adjustments."—Roget's Bridgewater Series.

And if we contrast the principal functions of animals and plants we find that the union between them is so intimate that neither could subsist without the other. Mr. Balfour, in his book entitled "Botany and Religion" (p. 127), has formulated the following index, which shows at a glance that there is a patent design and intended order in the mutual dependence existing between the vegetable and animal kingdoms.

AN ANIMAL	A VEGETABLE
Is an apparatus of combustion, or oxidation;	Is an apparatus of reduction, or deoxidation;
Possesses the faculty of locomotion;	Is fixed;
Burns carbon;	Reduces carbon;
Gives off carbonic acid;	Fixes carbonic acid;
Consumes oxygen, starch, gum and sugar;	Produces oxygen, starch, gum and sugar;
Produces heat;	Absorbs heat;
Restores its elements to air and earth;	Derives its elements from air and earth;
Transforms organized into mineral matter.	Transforms mineral into organized matter.

Could such an efficient interdependence be the result of chance! Would it not be paramount to the most absurd folly to deny the existence of an intended order in the face of such a remarkable and efficient economy! Let us rather admit the existence of an All-wise Creator and learn to love Him better as we advance in the knowledge of the vegetable kingdom.

"Eternal Power from whom these blessings flow,
Teach us still more to wonder, more to know!
Seed-time and harvest let us see again!
Wander the leaf-strewn wood, the frozen plain!
Let the first flower, corn-waving field, plain, tree,
Around our home, still lift our souls to Thee!
And let us ever, midst Thy bounties, raise
An humble note of thankfulness and praise."

—*Robert Bloomfield, 1823*

There is an intimate reciprocal relation between natural and revealed religion, and he who studies botany intelligently will soon become convinced of this truth. The meadows, forests and fields become abodes of earnest and meditative delight of the highest order. "A fool's eyes are in the ends of the earth," says Solomon, ever in search of that which he has not seen, and, in all probability, never shall see nor understand. Wisdom and knowledge are near at hand, to be drawn from things the most commonplace. "Raise the stone and thou shalt find Me; cleave the wood, and there am I."

The same good and beneficent Creator who reveals Himself in a mute manner through the plants and flowers of the earth, has deigned lovingly to reveal Himself in a far more perfect manner through Revelation. "And God said: Let the earth bring forth the green herb, and such as may seed, and the fruit tree yielding fruit after its kind, which may have seed in itself upon the earth. And it was so done."—Gen. 1:11.

Moreover, the smallest of known plants, if closely examined, is able to cheer, console, and elevate the believer. What more commonplace than the daisy?

"Yet, who but God, who arched the skies
And pours the day-spring's living flood,
Wondrous alike in all He tries,
Could rear the daisy's purple bud?

Mould its green cup, its wiry stems;
Its fringéd border nicely spin;
And cut the gold-embossed gem,
That, set in silver, gleams within?
And fling it, unrestrained and free,
O'er hill and dale, and desert sod,
That man where'er he walks may see
In every step, the stamp of God."
—*John Mason Good.*

In nature, as well as in the order of grace, Almighty God often attains a certain important end by using apparently insignificant means. "God's ways are not as our ways, nor His thoughts as our thoughts."—Isaias 40:9. In His infinite wisdom God knows how to combine about fifteen elements into the well-nigh countless variety of herbs, plants and trees that adorn the surface of the globe and thrive in the beds of rivers, lakes and seas. And what a wonderful coöperation between the vegetable and mineral kingdoms! We everywhere find that the Creator of both has coördinated them and made them subservient to one another. How well this is illustrated in the lichens, those seemingly useless little plants that form the green and yellow coverings of rocks. Whoever has traveled in mountainous districts will remember having seen them on all sides of bleak, projecting rocks, otherwise devoid of vegetable life. Some varieties of lichens secrete an acid (usually oxalic acid), by means of which the

hardest rock is gradually corroded and converted into soil. Thus the barren peaks of mountains are invaded by this little plant, and made into rich soil, which is carried into the plains and valleys below. To this minute fertilizer do we, also, trace in great measure the soil formed on the coral islands in the Pacific Ocean, which furnishes the necessary nourishment to the cocoanut palm. And this tree, in turn, furnishes the natives with almost everything they need for the sustenance of life. Thus we see the modest little lichen converting rocks into virgin soil, and the barren coral islands into fertile gardens.

Again, what a wonderful example of God's infinite power do the charming coral reefs furnish! How insignificant the means! Yet, how grand and immense the achievement! The coral structures of the microscopic polyps give us a striking instance of the simplicity and wondrous sublimity of the Creator's works. Even the *American* nation would lack the enterprise to undertake the construction of such an edifice in mid-ocean.

"Each wrought alone, yet all together wrought,
Unconscious, not unworthy instrument,
By which a Hand invisible was rearing
A new Creation in the secret deep.
Omnipotence wrought in them, with them, by them;
Hence, what Omnipotence alone could do,
Worms did."

—*"Pelican Island," Montgomery.*

Psalm 103

BENEDICITE

Bless the Lord, O my soul! O Lord my God, Thou art exceedingly great. Thou hast put on praise and beauty, and art clothed with light as with a garment.

Who stretchest out the heaven like a pavilion; who coverest the higher rooms thereof with water.

Who makest the clouds Thy chariot; who walkest upon the wings of the winds.

Who makest Thy angels spirits; and Thy ministers a burning fire.

Who hast founded the earth upon its own bases; it shall not be moved for ever and ever.

The deep like a garment is its clothing; above the mountains shall the waters stand.

At Thy rebuke they shall flee; at the voice of Thy thunder they shall fear.

The mountains ascend, and the plains descend into the place which Thou hast founded for them.

Thou hast set a bound which they shall not pass over; neither shall they return to cover the earth.

Thou sendest forth springs in the vales; between the midst of the hills the water shall pass.

All the beasts of the field shall drink; the wild asses shall expect in their thirst.

Over them the birds of the air shall dwell; from the midst of the rocks they shall give forth their voices.

Thou waterest the hills from Thy upper rooms; the earth shall be filled with the fruit of Thy works:

Bringing forth grass for cattle, and herb for the service of men.—*Psalm 103:11-14.*

CHAPTER IV

MAN, THE SOVEREIGN TENANT OF THIS PALACE WONDERFUL, IS THE SOLE CONSCIOUS BENEFICIARY OF HIS CREATOR'S GOODNESS AND MAGNANIMITY

IT is not a matter of conjecture that the entire visible universe is called into being by the Almighty for the special and direct benefit of man. Surely God could not have been more generous, more benign, more loving, more munificent in the natural order, than He has been. Nor has He simply *created* the universe with its infinite number of beings! No, He also *preserves* it, and provides in a thousand different ways to secure the happiness of man,—its king. When contemplating this most evident and consoling truth, the Holy Bishop of Hippo, St. Augustine, explained in an ecstasy of joy: "Lord, Thou hast care of every individual as if he were the only one over whom Thou watchest; and Thou hast care of all, as if all were only one single individual." "Thou hast made the little and the great, and thou hast equally care of all."—Wisd. 6, 8.

Why thus longing, thus forever sighing,
For the far-off, unattained, and dim,
While the beautiful, all round thee lying,
Offers up its low, perpetual hymn?

Wouldst thou listen to its gentle teaching,
All thy restless yearnings it would still:
Leaf and flower and laden bee are preaching
Thine own sphere, though humble, first to fill.

And if through earth's wide domains thou rovest,
Sighing that they are not thine alone,
Not those fair fields, but thyself thou lovest,
And their beauty and thy wealth are gone.

Nature wears the color of the spirit;
Sweetly to her worshipper she sings;
All the glow, the grace she doth inherit,
Round her trusting child she fondly flings.
—*Harriet Winslow Sewall.*

If we ascend in spirit high above this globe of ours with its endless variety of mineral substances,—with its flowers, herbs, plants and trees,—with its fishes, birds and animals,—and consider it in its relation to the universe, ah, how great and magnificent does not Almighty God appear! Let us remain in the mere natural order and then strive, if we can, to gain an adequate idea of this palatial home which our God has prepared for us! Ah, what generosity, what liberality, what magnificence on the part of our Heavenly Father! Next to His own glory the great visible object and end in creating the universe and adorning our little globe with a firmament strewn with countless stars and planets was to show His bounty towards us and

to increase our temporal happiness. And how infinite this bounty!

What a grain of sand is to the boundless seashore, that is the earth when compared with the universe. Yes, this entire globe which we inhabit, with its many hills and mountains, with its valleys and canyons, with its plains and prairies, with its rivers, lakes, seas and oceans, is but an atom floating about in unbounded space. An insignificant little nothing occupying an obscure corner of the vast universe. And yet this little globe called the earth is the most important of all the celestial bodies, because it is the present home of God's children. For our direct benefit and happiness has the Almighty called forth those countless orbs and phenomena that adorn the skies. Ah, what a sublime idea do we not obtain of our Heavenly Father when we view the diamond bedecked ceiling of our earthly palace! What an exquisite order, beauty and harmony do we not behold when viewing the firmament on a starry night! All is unity, all harmony, amid those countless stars, mighty orbs and solar systems. How beautiful, how great, how sublime and benevolent must not their Creator be! Did we not know that this grand floating palace was created for us we would be tempted to think that it were intended for angelic spirits and not for poor, frail mortals.



TRILLIA

SURSUM

Ye golden lamps of heaven, farewell,
With all your feeble light;
Farewell, thou ever-changing moon,
Pale empress of the night.

And thou, refulgent orb of day,
In brighter flames arrayed,
My soul, that springs beyond thy sphere,
No more demands thine aid.

Ye stars are but the shining dust
Of my divine abode,
The pavement of those heavenly courts
Where I shall reign with God.

The Father of eternal light
Shall there His beams display;
Nor shall one moment's darkness mix
With that unvaried day.

No more the drops of piercing grief
Shall swell into mine eyes;
Nor the meridian sun decline
Amidst those brighter skies.

—*Philip Doddridge.*

1. Man is the Image of His Maker

"Art thou a type of beauty, or of power,
Of sweet enjoyment, or disastrous sin?
For each thy name denoteth, Passion-flower!
Oh, no! thy pure corolla's depth within

We trace a holier symbol; yea, a sign
'Twixt God and man; a record of that hour
When the expiatory act divine
Cancelled that curse which was our mortal dower.
It is the Cross!"

—*Sir Aubrey de Vere.*

It is by supernatural faith accompanied by good works that man,—the crown and glory of visible creation,—attains the end for which he has been created. How different the various conceptions of man. One views himself as a conglomeration of a number of elements jumbled together in a more or less haphazard manner; another admires the wonderful mechanism of the human organism, but loses sight of the directing mind; a third reckons the commercial value of the ingredients which constitute the human body, but denies the very existence of a human soul.

"An ingenious chemist has made the claim that the average human being is worth $18,300.00 from the chemical standpoint. His calculations are based on the fact that the human body contains three pounds and thirteen ounces of calcium; and calcium is worth $300.00 an ounce."*

"An average man of 150 pounds contains the constituents found in 1,200 hens' eggs. There is enough gas in him to fill a gasometer of 3,649 cubic feet. He contains enough iron to make four tenpenny nails. His fat would make seven-

* "The Scientific American."—April 12, 1902.

ty-five candles and a good sized cake of soap. His phosphate content would make 8,064 boxes of matches. There is enough combined hydrogen in him to carry him above the clouds. The remaining constituents of a man would yield, if utilized, six teaspoonfuls of salt, a bowl of sugar, and ten gallons of water."

"A man has 500 muscles, 1,000,000,000 cells, 200 different bones, 4 gallons of blood, several hundred feet of arteries and veins, more than 25 feet of intestines, and millions of pores. His heart weighs from 8 to 12 ounces, capacity from 4 to 6 ounces in each ventricle, and its size is 5 by 3½ by 2½ inches. It is a hollow, muscular organ, and pumps 22½ pounds of blood every minute. In 24 hours the heart pumps 16 tons. It beats about 72 times a minute. In one year an average man's heart pumps 11,680,000 pounds of blood."

The responsiveness of some of the members and organs of the human body is well nigh incredible. In the course of a lecture at the Conference of Musicians held in Dublin, Ireland, in the year 1903, it was stated that "a pianist in view of the present state of piano-forte playing has to cultivate the eye to see about 1,500 signs in one minute, the fingers to make about 2,000 movements, and the brain to receive and understand separately the 1,500 signs while it issues 2,000 orders."*

* "Scientific American."—May 2, 1903.

"Regarded from a merely mechanical standpoint," says Dr. W. R. C. Latson, "the human body is so infinitely complex, so exquisitely responsive, so strangely perfect, that by comparison it dwarfs all other things known to man and stands alone as the wonder of the world."

"In all mechanics and architecture, in all the machines and inventions of men, there is not to be discovered one single device that is not found in the human body. The arch, the lever, the inclined plane, a pump, a grist mill, a camera, a stringed instrument, hinges, pulleys, ball and socket joints,—all these and a score of other man-made inventions are merely crude copies of the wonderful devices found in his own body."

"The lungs, through their 600,000,000 tiny openings, have a surface equal to the floor of a room forty feet square. The body contains 2,000 miles of tubing through which half a barrel of fluid is constantly pouring. The blood travels 168 miles a day. Truly, we are 'fearfully and wonderfully made'!"

How striking, in this connection, the statement of the great American geologist and naturalist: "The body of man was not made more completely for the service of the soul than the earth, in all its arrangements from beginning to end, for the spiritual being that was to occupy it."*

* "Manual of Geology."—Agassiz.

How grand, moreover, is the human intellect, that faculty, in virtue of which we can be likened to the Prototype. By his understanding man rises incomparably above all the other visible creatures of God; and by his free-will he can, in truth, become God-like in his thoughts and actions. Indescribably swift is the velocity of the sun's rays. A ray of light at its ordinary speed could encircle the earth in the twinkling of an eye. But swifter still is human thought. The mind can instantly reach the farthest star, or planet. Yea, the astronomer can calculate the very size and distance of those gigantic worlds poised in space. The space and area occupied by the celestial bodies are well-nigh limitless. Without the slightest exertion, however, the human eye views and encompasses the entire firmament. True, we cannot hope ever to reach even the nearest one of the celestial bodies. It would be the sheerest folly to imagine that by any means Jules Verne's "Trip to the Moon," or a similar achievement, might be realized. Yet we can invade and explore those vast seas of blue and their countless islands with the mind. Thus we can take possession of them intellectually. And this intellectual invasion and exploring of other worlds forms one of the keenest of human delights. Surely this is a sufficient reason for their existence, and our gratitude.

Were a king to erect a magnificent palace

and present it to a friend for his sole use and occupancy, the gift would be more highly appreciated and, likewise, objectively greater, than if only a few rooms, or a single story were placed at his friend's disposal. Thus, he who believes that the human race are the sole occupants of the material universe must needs appreciate God's goodness and magnanimity more highly than he who holds the opinion that also the other planets are inhabited. Such a man will consequently give greater glory to God. Now, there is reason for believing, as we saw, that the Almighty has created the material universe directly for man "whom He has made to His own image and likeness" and, only "a little less than the angels" and "set over the works of His hands." The more we learn of the material universe the more we are moved to give glory to its Creator.

The earth has been created for our actual occupancy and possession. It is a superb abode made for man alone. The myriads of stars, planets and other heavenly bodies are as so many gems set in the ceiling of Our Palace Wonderful. "Those glittering constellations form the encrusted monogram of God, in the midnight sky."—Fr. Nicholas Ward, C. P. The great variety and beauty of scene displayed in the grand dome above us exalts the mind and expands the heart with reverence and gratitude.

In the realms of variegated tints and shade around and about our mansion beautiful we ever behold new and attractive proofs of divine prodigality. Whether we behold the sky at dawn, noon day, or sunset, we find an Invisible Hand busily engaged in adorning the spacious halls of our superb palace with the most exquisite tapestry. The artist may be able to recall an obscure glimpse of that transcendent beauty, but none can ever hope to give us a faithful picture of the reality. Alas, it is only too true that

"We often praise the evening clouds,
And tints so gay and bold,
But seldom think upon our God,
Who tinged those clouds with gold.
Those evening clouds, that setting ray,
And beauteous tints, serve to display
Their great Creator's praise;
Then let the short-lived thing called man,
Whose life's comprised within a span,
To Him his homage raise."

"Heaven fades away before our eyes,
Heaven fades within our heart,
Because in thought our Heaven and Earth
Are cast too far apart.
Ah! Had we but the gift to trace
The wisdom of the starry sky,
No gloomy types would meet our eye,
And to the signs so sweetly wrought,
By moon and stars, there would be naught
But kind interpretation given."

PSALM 8

"For I will behold Thy heavens, the works of Thy fingers; the moon and the stars which Thou hast founded.

What is man that Thou art mindful of him? or the son of man that Thou visitest him?

Thou hast made him a little less than the angels, Thou hast crowned him with glory and honour; and hast set him over the works of Thy hands.

Thou hast subjected all things under his feet, all sheep and oxen; moreover the beasts also of the fields.

The birds of the air, and the fishes of the sea, that pass through the paths of the sea.

O Lord our Lord, how admirable is Thy name in all the earth!"—*Psalms 8:4-10.*

2. Man, the Object of God's Loving Providence in this World, is Destined for Eternal Happiness in the Next World

If a person, upon entering a house would find it nicely furnished and everything in the best of order, he would say that it is evidently under the management of some person. The simple sketch outlined in the preceding pages imperfectly reveals a grand and superb palace of well-nigh incomprehensible proportions and exquisite beauty. Quatrefages, in an encomium on the design of this unique work of the Almighty, says: "We see nothing extraordinary in the cry of adoration which escapes from Linnæus at the very introduction of his immortal 'Systema Naturæ'; while we can easily compre-

hend the feeling which actuated Geoffrey St. Hilaire, an illustrious naturalist, when he began and ended one of his last works with the exclamation, 'Glory be to God!' "

A strong and intelligent faith in the existence of an All-wise and Supreme Creator, who directs and governs the world, is therefore a fundamental postulate of reason, and easily obtained. Such a faith, too, is a necessary preamble for that other higher submission of the intellect and will, "without which it is impossible to please God."—Heb. 11:6. Natural faith leads us to the portals of heaven; supernatural faith grants us a glimpse of heaven itself,—our future home. Grand, indeed, is this our temporal abode, but grander, beyond compare, is the celestial paradise, which was made before the foundation of the world.

> "The man of Faith sees into heaven
> Where sages but detect its law;
> Judge which the better wisdom is,
> And who hath holier love and awe."

The object-matter of the faith here referred to are the truths revealed by Almighty God to mankind in a supernatural manner. These truths are contained in the Bible and tradition. Their sum total is called the deposit of faith, which was finally completed at the death of the last apostle. "Catholics regard the living voice of the Church at all times as the authentic in-

terpreter of Divine Revelation, and there is no appeal from this voice; Protestants, on the other hand, hold that the written Word of God is the supreme rule; that the Revelation thus given by God is to be learned by each Christian reading the Bible; and that this reading conducted under proper conditions will not lead him astray."—Outlines of Dogmatic Theology, Hunter, S. J., Vol. I, No. 154.

Revelation, in its etymological sense, signifies the withdrawal of a veil. Its truths, in the Catholic mind, withdraw a veil from man's natural vision, and enable him to see above and beyond mere natural ken. Divine Revelation teaches us our true end, and the means to be employed in order to secure that blessed goal. Each and every truth contained in Divine Revelation is, therefore, to be accepted by man, since they all rest on the veracity and authority of the Almighty who enjoins their acceptance.

The infidel and the rationalist will not admit the necessity of a Divine Revelation; many will even deny that it is possible for the Almighty to reveal truths to mankind. To the man who reflects, however, there can scarcely be anything more plain or certain than the possibility of such a Revelation on the part of God. Owing to His infinite perfection and His omniscience the Almighty certainly knows many things of which we are in ignorance; and who will assert that God is not able to communicate some of His

superior knowledge to us His rational creatures? Since He is omnipotent, *nothing* is impossible to Him.

Moreover, since the Creator's intellect is infinitely more perfect than any created intelligence, He must necessarily have a clear and comprehensive insight into many things that we are unable to understand. What should hinder Him from revealing, also, truths of *this* kind,—or mysteries? To deny the existence of such revealed truths is tantamount to denying that the Divine intellect is superior to the intellect of man, and that the Infinite Creator is greater than the finite creature.

It is, moreover, not only possible for Almighty God to communicate truths to man, but it is meet and just that He do so. Mankind stands in need of divinely revealed truths. Every human being possesses an intellect which essentially seeks the truth. The acquisition of new truths develops and perfects the human intellect. What is more natural, then, than that the Creator should assist man in perfecting the God-like faculty with which He has endowed His creatures. This He does in Divine Revelation. Also the acquisition of a truth which is above our reason and unfathomable to our limited understanding perfects our intellect; for its acquisition increases our knowledge and certainty, and reveals to us the grandeur and majesty of God.

Again, according to the disposition of an all-ruling providence the natural law, which is engraven in the heart of man, is to be elucidated by the revealed or written law of God. It is often well-nigh impossible, especially since sin has clouded man's mind, to learn clearly the dictates of conscience and the mandates of the unwritten law without the aid of Divine Revelation. Some of the greatest minds of antiquity never attained to the knowledge of some of the most ordinary truths about God and morality. What a keenness of intellectual vision did not such men as Socrates, Plato, Aristotle and Cicero possess! Yet they lived and died in ignorance of some of the most fundamental tenets of mere natural religion. The support which his religious knowledge gave him did not protect a Socrates against most shameful disorders. Plato, in spite of being an acknowledged moralist of great repute, believed in polytheism. The God of Aristotle was, indeed, the Creator of all things, but a Creator that no longer concerned himself about the world. And does not the great Cicero exclaim, in the bewilderment of his mind, "It would require a Divine knowledge to discern the true God among so many false ones!" We may conclude how difficult it must have been for the ordinary mind in antiquity to learn the true God and the tenets of a natural religion, when the intellectual giants were scarcely able to do so. And what shallow and

contradictory theories on man and the world are the outcome when one deliberately closes his eyes to the light of Divine Revelation! The one theory quickly overturns and destroys what the other would establish. Their authors burn the midnight oil vainly striving to prove that man has not been created, or that he is self-sufficient. They seek to satisfy themselves and bewilder others by catchy terms which are deliberately left undefined. In vain will they strive to evolve light from their confused brain, for light must come from without; it cannot be evolved from darkness within.

But even the deifiers of human reason, at least implicitly, admit the necessity of a Divine Revelation. At a banquet which that fanatic of reason, Voltaire, gave one day to a number of his friends, some one began cracking jokes about Revelation. "Not too loud," said Voltaire, as one of his servants came within hearing distance, "lest, perchance, he walk off some day with my silverware." So a Revelation on the part of God is an admitted necessity in order that men respect the property rights of their neighbor! The great German Shakespeare, Goethe, is said to have cried out in his dying hour for "more light."* Let us hope that he did not deliberately close his eyes during life to the benign and supernatural light of Revelation, which alone can illumine our paths heav-

* That Goethe meant spiritual light is denied by some of his biographers.

enward. When realizing that her time of departure was drawing nigh, Mary Somerville,—that great mathematical genius,—said to her nurse and constant attendant: "Hold my hand, please, when you see me passing away, that I may not feel the desolation of going forth alone into the awful darkness!" Darkness, indeed, an "awful darkness," when not lit up by the soft, golden rays of God's Revelation!

The light of reason alone cannot banish this darkness entirely. Countless thousands have ended miserably after spending a lifetime in unbelief. How many have erred by seeking their last end in the arts and sciences! These may soothe man's craving after the good, beautiful and true, but they cannot satisfy it. The discoveries of scientific research and the productions of the fine arts are well worthy of man's endeavors; but they must ever remain means to an end. Their pursuit must be made subservient to a supernatural destiny. The study of nature must lead up to nature's God. The material world is intended by its Creator to serve us as a commentary to His Revelation. So, too, must all philosophy begin with, and end in God,—the Eternal Truth. Even though man were still in a purely natural state and intended for mere natural happiness, the present light of his reason alone would scarcely suffice to direct him to his end.

Since God, however, has graciously deigned

to raise man to the supernatural order and destined him for a supernatural end, a Divine Revelation has become absolutely necessary. Without supernatural faith it is now "impossible to please God." The person who imagines that he can get along without the aid of divinely revealed truths is laboring under a delusion. The light afforded by our unaided reason compared with the light of Divine Revelation is as the light of a fire-fly to that shed throughout the solar system by the sun.

It is hard to estimate the great good effected by Divine Revelation! Suppose that all its many consoling and life-giving truths were suddenly obliterated from men's minds! In spite of our being in the joyful possession of the human knowledge and experience of the generations that have come and gone, were the influence of the Old and New Testament to disappear from the world, we would very soon occupy the same depth of moral depravity held by Pagan Rome. As then in a short time every vice and crime would have its patron or patroness in some god or goddess. Yes, we need Divine Revelation and cannot secure our eternal destiny without it. Men of the highest intellectual genius throughout the Christian era have, like St. Augustine, thought their time well spent in studying and meditating its sublime and inspiring truths. They are wont to compare the light of reason with that of the moon and

the light of faith with that of the sun. Should "the moon" eclipse the light of "the sun," that is, should human reason place itself between man and faith, man will find himself enveloped in moral and intellectual darkness, unable to live by the life of "the children of light."

And the Catholic Church has ever been a faithful custodian, staunch defender and infallible interpreter of this greatest of God's gifts to man. She possesses the authority from Jesus Christ, the Son of God, to teach and explain Divine Revelation to all nations of all times, and hence she sends her divinely appointed priests "into the whole world" to "preach the Gospel to every creature." And what does this Gospel teach concerning our origin and destiny? What does it tell us about God's relation to man, and man's relation to God?

The Apostle of the Gentiles concludes his Epistle to the Romans, in which he lauds the unfathomable wisdom of God, with the memorable words: "For of Him, and by Him, and in Him are all things; to Him be glory forever." In this short sentence of Divine Revelation we are taught the origin and destiny of all things. These few words, penned under Divine inspiration solve the "riddle of the universe." As all things created have gone forth from God, so do all things, if rightly viewed, readily lead up to God. When beholding the manifold creatures of God, whether in detail or as forming one

complete entirety, every intelligent being is prompted to exclaim with St. Paul: "Of God, and by God, and in God are all things; to Him be glory forever."

What an immense variety and beauty of form do we not discover in the few elements that constitute the mineral kingdom! Any one of the many kinds of sand, stone, rocks, shells, fossils, or soils distributed throughout the earth furnishes an abundance of matter for study and admiration. The corals, the crystals, the pearls, the precious stones, all have their peculiar beauty and attractiveness. In fact, even a single grain of sand is of interest to a man who understands mineralogy; for he can discern therein unmistakable traces of an infinitely perfect and loving God, who has created all lifeless creatures and distributed them in a manner suited to support the vegetable and animal life of the globe. The more deeply a mineralogist delves into his interesting branch of knowledge, the more he will become convinced that all the mineral substances were created to serve the higher grades of created beings.

Even a superficial observer of the visible world can easily discern, moreover, that the mineral substances are intended by Almighty God to furnish the vegetable kingdom with its necessary nourishment. And here, again, what wonders do we behold! We see the entire earth clothed and adorned with thousands of

different species of flowers, shrubs, and trees. And the most insignificant of these reveals a world of beauty and design to the intelligent student. Whether we choose to contemplate a blade of grass or one of those stately pines in Mariposa Grove, California, whether the humble daisy by the wayside, or the wondrous Rafflesia with its flower of seven to eight feet in diameter, each and every individual member of the vegetable kingdom, if rightly viewed, manifests the greatness, the beauty, the munificence, of a loving Creator. They each teach us that "of God, and by God and in God are all things."

Mungo Park, an explorer of note, whilst traversing the wilds of Africa some years ago, was set upon by robbers and left by them to die of starvation. When about to abandon all hope and give up to despair, his eye fell upon some moss growing on the underside of a sun-scorched rock. This circumstance, he tells us, gave rise to the following reflection: "Can that Being who planted, watered and brought to perfection in this obscure part of the world this little plant, a thing which appears of so small importance, look with unconcern upon the situation and sufferings of creatures formed after His own image? Surely not!" "Reflections like these," writes the learned explorer, "would not allow me to despair. I rose to my feet and disregarding both hunger and fatigue, traveled instantly onward, assured that relief was near

at hand. Nor was I disappointed. For the same Creator who had provided the necessary nourishment for that little plant, which I had seen growing beneath the rock, had also a provident care of me. I soon discovered a caravan of travellers who gave me a most hospitable reception."*

Yes! A loving Creator has called into being every little plant, herb, flower and tree. He it is, too, who sustains the life He gives. He wards off from the vegetable creation destructive winds and injurious droughts. God it is who sends the rain and sunshine, and robes the snow-white lily, and weaves the carpets of the fields. For, says the Inspired Writer, "fire, rain, hail, snow, ice, stormy winds, fulfill God's word."

This provident care of the Almighty over the vegetable kingdom, however, is to serve a higher end. The Creator of heaven and earth has, indeed, solicitude for the life and propagation of the herbs and plants, but only in so far as these are needed to further the welfare of a higher class of beings, viz., the animals. And, again, what an immense variety of beings does not here rivet our attention at the very first glance of the mind's eye! Who, for instance, is able to classify the countless inhabitants of the boundless ocean! Who would attempt to name the thousands of animals that roam over the earth! Who, the multitudinous variety of winged song-

*"Travels in the Interior Districts of Africa."—M. Park, p. 243.

sters that flit through the air and rejoice the heart of man! The beauty, the instinct, the ingenuity and keen sight of these various kinds of birds and beasts have ever been, and ever shall be subjects of wonder and amazement to every intelligent man who gives them a serious thought.

And for all these many creatures, which are endowed with the faculties of perceiving and feeling, the Almighty Lord of the Universe cares and provides as if they alone were the sole object of His solicitude. They turn their eyes towards Him for sustenance, and receive nourishment in due time. "It is God," says St. Luke, "who giveth to all life, and breath, and all things." Though they neither sow, nor reap, nor spin, still they live and thrive. Yea, "not even a sparrow falls from the roof without the knowledge and consent of its All-wise and Provident Creator."

But here again we discover the universal law, creatures of a lower order are destined to serve those of a higher. It is easy to learn that all irrational creatures are subject to man. Man, alone, is endowed with understanding and free will, and these prerogatives make him superior to all other mundane creatures. Everywhere, then, we observe the wisdom, and greatness, and sublimity of an Omnipotent and benign Creator. The creatures of a lower grade serve those of a higher, and all is order and

harmony. It is only when man interferes and crosses the plans of Almighty God that the order and harmony intended by Divine Providence are for a time disturbed.

"Consider the lilies of the field, how they grow. They labor not, neither do they spin. But I say to you, that not even Solomon in all his glory was arrayed as one of these. And if the grass of the field, which is today, and tomorrow is cast into the oven, God doth so clothe, how much more you, O ye of little faith?"—Matt. 6:28-30.

Yes, the manifold forms of vegetable life, with which our temporal home is carpeted and adorned, are well calculated to inspire man with a reverential confidence in the

"Great Universal Cause, mysterious Power
That clothes the forest, and that paints the flower,
Bids the fell poison in the upas grow,
And sweet nutrition in the maple flow;
Where'er we turn, the impartial eye must see
Each leaf a volume,—its great Author, Thee;
Nor less in every twig than Aaron's rod,
Behold the agency of Nature's God."

"The visible is but a fair, bright vale
That winds around the great Invisible;
The Finite—it is nothing but a smile
That flashes from the face of Infinite;
A smile with shadows on it—and 'tis sad
Men bask beneath the smile, but oft forget

The loving Face that very smile conceals.
The Changeable is but the broidered robe
Enwrapped about the great Unchangeable;
The Audible is but an echo, faint,
Low whispered from the far Inaudible;
This earth is but an humble acolyte
A kneeling on the lowest altar-step
Of this creation's temple, at the Mass
Of Supernature, just to ring the bell
At Sanctus! Sanctus! Sanctus! while the world
Prepares its heart for consecration's hour.
—"The Seen and the Unseen."—*Father Ryan.*



THE LA FRANCE ROSE.

CHAPTER V

A STUDY OF THE UNIVERSE INCREASES FRATERNAL CHARITY, AS WELL AS THE LOVE OF GOD

THE contemplation of the visible universe is well calculated to awaken and increase the liveliest sentiments of true Christian charity. If ever you have made an ocean voyage, you will remember how your hearts warmed towards your fellow-passengers. Hardly has the ship ploughed the waters of the "high seas,"—away from everything visible, save the endless waters beneath and the grand dome above,—when one feels and realizes that all those on board constitute, for the time, a new-formed family. All have gone forth from the same port, and all hope to arrive at the same goal. Cut off from the rest of mankind, the voyagers are all closely united by common interests, and exposed to common dangers. If prejudices existed before they are now largely forgotten and a strong friendship unites all on board.

It should seem that a contemplation of the visible creation should have the same effect upon every intelligent beholder. We find ourselves on this sailing vessel,—called the earth,—speeding on through space at a marvelous veloc-

ity. Astronomy and religion teach us that we, as well as all else in existence, are under the guidance and command of a Supreme Pilot. As there are physical laws governing the material world, so there must be moral laws governing the rational world. We all have gone forth from the Creator and shall, ere long, arrive before His tribunal to be judged. The Almighty Creator of the universe is the "beginning and the end" of every human being. We, on this little globe have, therefore, common interests and common dangers. We are all on a journey through space immeasurable. All our fellowmen are, therefore, fellow-passengers on the voyage through time to eternity, from earth to heaven,—our common home. Should not this circumstance inspire us with kindly and charitable sentiments towards all men?

"Thy Father is mine, and mine is thine;
We both are His equal care;
His goodness, and love, and blessings benign,
We each as His children share."

"In sympathy, then, I give thee a hand
And greet thee as thus we go,
And pledge a renewal in that bright land
Where pleasures perennial grow."

—*Anonymous.*

All the various departments of visible creation seem to be intimately connected and dependent upon one another. Why then should

not men be united? If we are to believe Dr. James Hamilton "the dark history of chaos written by the Almighty's hand on the rocky skeleton of our globe is telling now to the earth's inhabitants of the stupendous power that framed their rolling home,—of that unfathomed wisdom, that unbounded goodness, at whose manifestation the morning stars sung together, and at the fuller exhibition of whom, the redeemed bands chant forth their meed of praise."

"In whatever direction," says Sir Charles Lyell, "we pursue our researches, whether in time or space, we discover everywhere the clear proofs of a creative intelligence and of His foresight, wisdom and power."

So, too, in regard to the vegetable kingdom. "Every member of the vegetable kingdom," says the eminent botanist, Mr. Balfour, "from the lofty to the most minute and transient,—from the cedar of Lebanon to the hyssop on the wall,—has its peculiar office and is fitted to effect an especial end in the economy of nature."*

"Thought is visible everywhere," remarks Agassiz, "in geological distribution, in organic structure and gradation. Everywhere there is an intellectual connection running through the whole. Were we not intellectual beings, allied by the nature of our intellect to the maker of these, we could not read them."

* "Botany and Religion."—p. 11.

"Each moss, each shell, each insect, holds a place,
Important in the plan of Him who framed
The scale of beings; holds a place, which, lost,
Would break the chain, and leave a gap behind
Which nature's self would rue."

—*Stillingfleet.*

No believer can contemplate this terrestrial palace of ours without experiencing within his bosom, moreover, the love of God, and an ardent desire to be united with Him in Heaven. God, who dwells "in light inaccessible," is the end for which we have been created. All things should serve to bring us nearer that blessed goal. In the material world the sun is the center around which everything material in the solar system revolves. That "admirable instrument of the Most High" is the most perfect of all inanimate beings. Though the earth receives but a fraction of the total light and heat radiated by the sun, yet no living creature could exist without it. Banish the sun from our solar system, and darkness, confusion and chill death would be the result. Banish God from the hearts of men and intellectual darkness as well as spiritual death would quickly follow. In the moral and intellectual world, Almighty God is the center around which all is destined to revolve. The rapturous harmony of the spheres provides man with a never-failing source of joy and delight, and such will it be to us if we but make God, who produces that harmony, the center of our

moral and intellectual lives. The Almighty is "the beginning and the end,—the Alpha and the Omega,—the first and the last of every human being." As Lactantius well says: "The world was made that we might be here; we are born that we may know God, the Creator of the world and of us; we know God that we may worship Him, and receive immortality, so that, being made like the angels, we may forever serve our God and Father with them in the kingdom where He forever reigns."

He who by divine grace is able to read created things aright is prompted to praise and glorify his Creator without ceasing. "Beautiful are the things which Thou, O Lord, hast made; yet unspeakably more beautiful art Thou who hast created all." "Thyself, Lord, stirrest us to take delight in praising Thee; for Thou hast made us for Thyself, and our heart has no ease until it rest in Thee."—St. Augustine.

The contemplation of the unity and harmony which reign in the physical world will, therefore, awaken in the intelligent beholder the liveliest sentiments of charity towards God and man. And charity tends to unify and harmonize the hearts and minds of men.

"God, in the nature of each being, founds
Its proper bliss, and sets its proper bounds;
But as He fram'd a whole, the whole to bless,
On mutual wants built mutual happiness;
So, from the first, eternal order ran
And creature linked to creature, man to man."

There is no creature in the universe that if rightly viewed will not reflect the goodness of God towards us His children. And if Almighty God appears so loving, so provident, so beautiful, so great and bounteous as reflected in the obscure mirror of visible nature, ah, how incomprehensibly great, and good, and beautiful must He not be in Himself, as He is enthroned in Heaven. Yes, He who has created this—Our Palace Wonderful—as a temporal abode, has prepared an infinitely more beautiful home for us in the world to come.

"Here, in this world, no joy is quite complete. Sometimes the acquisition of earthly happiness is mingled with bitterness, again the consequence brings grief, oftener still the possessor is robbed of true happiness by the fear of losing that which has rendered him happy. The purest joys on earth are but a faint reflection of the happiness of heaven. The pleasures of this life awaken our desires, but fail to satisfy. Those of the next life, however, shall satiate us." "I shall be *satisfied*, when Thy glory shall appear." —Ps. 16:15. We remember the miracle Our Blessed Lord wrought on the poor invalid who had been a cripple the greater part of his life. For thirty-eight years he had been tortured by all the aches and pains human flesh is heir to. The joy he felt, when suddenly restored to full vigor and health, is as a grain of sand to the vast Sahara, compared with the delight that shall

accompany the restoration of our bodies in their glorified state. Think of it! Freed from every ill, every ailment, every pain,—from everything that might in the least detract from our unmingled happiness! Ah, who can imagine the joy that shall be our blessed portion when reunited to our glorified bodies! St. Paul tells us "that the body is sown in dishonor, but that it shall rise in glory."—I Cor. 15:42. It shall then be made susceptible of that alone which gives joy. Then the body freed from everything grossly material, shall be returned to us without the least stain of sin. Yes, the blessed shall shine like the stars of the firmament for all eternity. Another quality of the glorified body will be subtleness, i. e., it will be able to go from place to place with the rapidity of thought; for, as the apostle tells us, "our body is sown in weakness, it shall rise in power."—I Cor. 15:43. Our Divine Savior after His resurrection, as we know, suddenly appeared in the midst of the apostles, though every entrance to the hall in which they were had been firmly closed; this quality of penetrating any material substance at will is another characteristic of the glorified body. Yes! Freed from every bodily ill and grossness, we shall be able to go from place to place without the least corporal incumbrance of any kind.

We shall, however, not only be free from every ill in heaven, but we shall there, also, pos-

sess every good. Would that I had the tongue of an angel to describe the joys of heaven,—the realm of joy eternal,—the home of the just,—the land of the living,—where all tears shall be dried, where all hunger shall be appeased, where all thirst shall be quenched to inebriation with the torrents of God's joys! Would that I could adequately describe thee, O paradise!

I well know that no one can do full justice to this sublime subject. How could it be possible for man to describe that which "eye hath not seen, nor ear heard, nor heart conceived"? Yet though we cannot in this life fathom the felicity of heaven we know that it consists chiefly in seeing, enjoying, and loving Almighty God. The principal source of all heavenly joys is the beatific vision. There the blessed see God as He is, and are united to Him by the most intimate union possible. There we shall clearly see the infinite beauty of Him whom we love most. The sight of God will produce a happiness in us which will be eminently perfect and full. In heaven, Almighty God, who is infinite love, infinite beauty, infinite perfection, will reveal Himself to us in all His glory. We in our present imperfect state would be unable to endure the beatific vision. Our weak and frail nature is incapable of beholding so sublime a sight. Moreover, the moment we see God we shall possess and enjoy Him. He Himself assures us that "He will be our reward exceed-

ingly great." "He who conquers shall receive heaven (this), and I will be his God, and he shall be My son."

This possession of God begets a mutual, intense and everlasting love between the elect and their Creator. Here on earth, although they who love God are the happiest, yet their joy can never be perfect; for they cannot see the all-perfect beauty of Him they love; nor can they be certain that they shall always continue to love Him. In heaven, however, the love of the soul upon seeing God will be infinitely increased and secured for all eternity. Then, too, shall we perceive that all that is worthy of our esteem and love in this world, "all that is noble in man, grand in creation, or beautiful in nature, comes from that fathomless fountain of perfection as a faint ray of light from the sun"; hence, we cannot but love Almighty God with all our heart's affection, and this love of God will be a perennial source of joy to us.

Another unremittent source of happiness in heaven will be the company of the blessed. The immense joy that overflows the hearts of relatives and time-tried friends who meet after many years of separation is but as a tiny rivulet of the mighty stream of heavenly bliss which inundates the souls of the beatified. In heaven the joys of each individual are communicated to his neighbor, and all become as intimately united as fire and heat. There, the moment we

see the saints, their heroic and virtuous deeds shall be revealed to us. We shall then become united with the elect by the purest bonds of love, and we cannot but love them in return since they are endowed with all the excellencies and virtues that win our respect and regard. Ah, what a happiness it will be to enjoy the company of the blessed! To be able to associate with our guardian angel and the myriads of saints! What a joy must it not be to make the acquaintance of all the saints and martyrs whose glorious deeds gild the pages of history! And those illustrious heroes shall be our companions and intimate friends for all eternity.

What raptures of delight, too, shall entrance our senses as we wander, in such heavenly company, through that radiant Jerusalem which needs not sun nor moon to shine in it, since "God Himself is the light hereof!" "What joy to behold the gorgeous walls, the mighty columns and awe-inspiring arches of that city of gold, whose walls are of precious stones, whose gates are of sapphire and emerald. What delight to promenade through heaven's meadows and dales, and to behold those scenes which, like a charming landscape at early dawn, ever increase in beauty and variety."

"And dare I speak of the glorified Savior, and how we shall share in that love which St. John enjoyed when he leaned upon His bosom and heard the beating of His Sacred Heart? We

have no measure for a bliss like that; yet we know that Our Divine Savior also shall be our companion in heaven." "Amen, I say unto you, the Lord will gird Himself round, and pass among the blessed, and will minister unto them a banquet of eternal joy." Yes, he will minister a banquet of joy to every one of our five senses. Our five senses, refined and purified, shall be rendered capable of receiving and enjoying in an eminent degree all that an Omnipotent Power could devise to satiate them. Much that delights the senses here shall also form a part of their enjoyment there; for example, we know for a certainty that the heavenly mansions reverberate with an eternal Sanctus, Sanctus, Sanctus.

And who of us has not experienced that a sublime strain of music has often rendered him forgetful of all else, and elevated his mind to the very throne of God,—the source of all harmony? We are only too familiar with the beautiful legend that describes a heavenly joy corresponding to one of the most ordinary joys on earth,—the singing of a bird: Just as the first rays of the morning sun peered through the thick foliage of the neighboring hills a holy monk rose from devout prayer and entered the convent garden. Long had he been rapt in sweet contemplation of God's infinite goodness. The grandeur of the scenery now seems to invite him to join nature in glorifying and prais-

ing the Creator. His mind and heart are raised from nature to nature's God, when suddenly he hears a sound. What can it be? Never had he heard singing like this! His heart thrills with emotion for the strain had there found its accompanying chord. Louder and sweeter grows the strain as it draws nigh. On a tree-top hard by perched the snow-white bird that had thus enchanted him. The man of God advances in silent admiration and drinks in the charming melodies. Long does he listen to that rapturous singing which ever increases in clearness and harmony. He approaches nearer, and would fain catch the wonderful bird, but flying from tree to tree before the enraptured monk, it at last disappeared, when,—lo! instead of its singing, the monk now hears the familiar sound of the convent-bell, and hastens to answer its summons. But in the convent all is changed! In vain he looks for each well known face! In vain he seeks those who had long since departed this life! A century had glided by like an hour, whilst listening to the singing of that heaven-sent bird.*

Such is the effect of the joys of heaven! And if the entrancing effect of a happiness in heaven corresponding to the simple singing of a bird here on earth be so great, what must not be the rapturous delight produced by that music which fills the heavenly domain! What must not be

* Cf. "Golden Legend."—Longfellow.

the overwhelming effect of the singing of that countless angelic choir! Heaven alone can reveal what we cannot understand, nor imagine, "for eye hath not seen, nor ear heard, nor hath it entered into the heart of man, what things God hath prepared for them that love him."—I Cor. 2:9. "I shall be satisfied, when Thy glory shall appear."—Ps. 16:15; satisfied in MIND, satisfied in HEART, and satisfied **FOREVER!**

BENEDICITE

Blessed art Thou in the firmament of heaven; and worthy of praise, and glorious for ever.

All ye works of the Lord, bless the Lord; praise and exalt Him above all for ever.

O ye angels of the Lord, bless the Lord; praise and exalt Him above all for ever.

O ye heavens, bless the Lord; praise and exalt Him above all for ever.

O all ye waters that are above the heavens, bless the Lord; praise and exalt him above all for ever.

O all ye powers of the Lord, bless the Lord; praise and exalt Him above all for ever.

O ye sun and moon, bless the Lord; praise and exalt Him above all for ever.

O ye stars of heaven, bless the Lord; praise and exalt Him above all for ever.

O every shower and dew, bless ye the Lord; praise and exalt Him above all for ever.

O all ye spirits of God, bless the Lord; praise and exalt Him above all for ever.

O ye fire and heat, bless the Lord; praise and exalt Him above all for ever.

O ye cold and heat, bless the Lord; praise and exalt Him above all for ever.

O ye dews and hoar frosts, bless the Lord; praise and exalt Him above all for ever.

O ye frost and cold, bless the Lord; praise and exalt Him above all for ever.

O ye ice and snow, bless the Lord; praise and exalt Him above all for ever.

O ye nights and days, bless the Lord; praise and exalt Him above all for ever.

O ye light and darkness, bless the Lord; praise and exalt Him above all for ever.

O ye lightnings and clouds, bless the Lord; praise and exalt Him above all for ever.

O let the earth bless the Lord; let it praise and exalt Him above all for ever.

O ye mountains and hills, bless the Lord; praise and exalt Him above all for ever.

O all ye things that spring up in the earth, bless the Lord; praise and exalt Him above all for ever.

O ye fountains, bless the Lord; praise and exalt Him above all for ever.

O ye seas and rivers, bless the Lord; praise and exalt Him above all for ever.

O ye whales, and all that move in the waters, bless the Lord; praise and exalt Him above all for ever.

O all ye fowls of the air, bless the Lord; praise and exalt Him above all for ever.

O all ye beasts and cattle, bless the Lord; praise and exalt Him above all for ever.

O ye sons of men, bless the Lord; praise and exalt Him above all for ever.—*Daniel 3:56-82.*



Conclusion

We have now arrived at our journey's end. In mind and spirit we have been speeding through visible creation and endeavored to view it as an harmonious whole. The exquisite harmony and coöperation plainly visible throughout the material universe postulates the existence of an All-wise and Beneficent Creator. The deeper man's knowledge of nature, the firmer will be his convictions that all things material are subject to universal laws imparted to them by a Supreme Lawgiver. "Many things deemed invisible to secondary instruments," says Smyth, "are plain enough to one who knows how to see them." Centuries ago, when our forefathers were wont to contemplate the heavens under a geocentric aspect the paths of the heavenly bodies seemed unintelligible; as soon, however, as a superior mind advanced the heliocentric theory, the harmonious and interdependent movement of the solar system became more and more apparent.

Yet in spite of the great progress of the sciences we have every reason to be humble. The late Lord Kelvin was certainly one of the greatest among modern scientists. This learned man is quoted as having said in a jubilee speech at Glasgow, in 1896: "One word characterizes the most strenuous efforts for the advance-

ment of science that I have made perseveringly for fifty-five years; that word is failure. I know no more of the electric and magnetic forces, or of the relation between ether, electricity, and ponderable matter, or of chemical affinity, than I knew and tried to teach my class students in my first session as professor." What a beautiful lesson in humility for those who profess to comprehend the constitution of matter, and claim to be able to explain fully those things which the Almighty has not as yet revealed.

The changeableness, too, of all things material is well calculated to make us humble, and to direct our minds and hearts to a better and more lasting world. Starting with nonentity, we see, at the Creator's word, the space now occupied by the universe suddenly filled with chaos. This immense mass of unformed matter is set in motion and the solar systems are the result. This little mundane home of ours,—the earth,—is then subjected to the action of the elements and, at God's command, made to bring forth the herb, plant and tree. Animal life follows, together with man, who is the divinely constituted ruler over all things temporal and material. One generation of men succeeds the other, and keeps pace with the fleeting years and centuries. What is born in time, is destined to die in time. Material bodies,—whatever form they may take,—are sure to disintegrate and return to

the elements. The body of a full-grown man will at some time or another resolve itself into approximately 100 pounds of oxygen, 20 pounds of hydrogen, 20 pounds of carbon, 3 pounds of nitrogen, 3 pounds of calcium, and a few other mineral substances. A few years ago one of that class who admit the existence of nothing in man save the above ingredients, willed that his body be cremated and the ashes taken to the top of the Statue of Liberty and there strewn to the four winds. Why put anyone to such unnecessary trouble? Willy nilly, our bodies are destined to decay. The substances that compose them shall then be carried by the winds to the four corners of the globe. Dust is destined to return to dust. All forms of matter are continually subject to changes and transformations. What was once the body of a king is now divested of every mark or sign of royalty.

The human soul, however, is beyond the pale of material and visible substances and alterations. This is what makes the spiritual portion of man well-nigh infinitely more perfect than any form of corporeal matter. And this spiritual and immortal soul of ours shall at death return to its Creator to be judged. For "it has been decreed unto man once to die, and after this the judgment."—Heb. 9:27.

Even the *body* of man shall share in the reward or punishment meted out to each individual by the Omniscient Judge who called us

forth from nothingness and placed us here. "We must all be manifested before the judgment-seat of Christ, that everyone may receive the proper things of the body according as he hath done, whether it be good or evil."—II Cor. 5:10. God grant that we may all have those consoling words addressed to us: "Come ye blessed of My Father, possess ye the kingdom prepared for you from the foundation of the world." And surely we may confidently look forward to this blessed consummation,

"If Nature's forms a fountain prove
For faith unfailing, and a love
That breeds submission."
—*Faber.*

THE DEWDROP AND THE STREAM

The brakes with golden flowers were crowned,
And melody heard around—
When, near the scene, a dewdrop shed
Its lustre on a violet head,
And trembling to the breeze it hung!
The streamlet, as it rolled along,
The beauty of the morn confessed,
And thus the sparkling pearl addressed:

"Sure little drop rejoice we may,
For all is beautiful and gay;
Creation wears her emerald dress,
And smiles in all her loveliness.
And with delight and pride I see
That little flower bedewed by thee—
Thy lustre with a gem might vie,
While trembling in its purple eye."

"Ay, you may well rejoice, 'tis true,"
Replied the radiant drop of dew—
"You will, no doubt, as on you move,
To flocks and herds a blessing prove;
But when the sun ascends on high,
Its beam will draw me towards the sky;
And I must own my little power—
I've but refreshed a humble flower."

"Hold!" cried the stream, "nor thus repine—
For well 'tis known a power divine,
Subservient to His will supreme,
Has made the dewdrop and the stream.
Though small thou art (I that allow),
No mark of heaven's contempt art thou—
Thou hast refreshed a humble flower,
And done according to thy power."

All things that are, both great and small,
One glorious Author formed them all;
This thought may all repinings quell:
What serves His purpose, serves Him well.
—*Author Unknown.*

O. A. M. D. G.

INDEX

A

Addison, 55.
Agassiz, Professor, 93; 136; 157.
Agnosticism, 21 sqq., influence on human conduct, 23.
Albertus Magnus, 78.
Alcuin, 78.
Algol, 45.
Animal, and vegetable life compared, 125.
Aristotle, 144.
Asteroids, 46.
Astronomy, and religion, 66 sqq.; 156 sqq.
Astronomers, Catholic, 77 sqq.
Athanasius, St., 62.
Aubrey de Vere, Sir, 133.
Augustine, St., 11; 14; 130; 147; 159.
Avicenna, 30.

B

Babington, 66.
Balfour, 19; 109; 157.
Bayne, 44.
Bede, Ven., 78.
Benedicite, the, 129; 167.
Bianchini, 81.
Bloomfield, Robert, 125.
Bonald, de Viscount, 77.
Boscovich, S. J., 80.
Botany, and religion, 123 sqq.
Brown, Dr., 123.

C

Calendar, the, 79.
Calixtus III., 59.
Campbell, T., S. J., 28.
Campbell, Professor, 74.
Canals of Mars 73 sqq.
Cassini, 80.
Castelli, 81.
Castor and pollux, 69.
Catholic Fortnightly Review, 17; 23; 77.
Church, interest of in science, 77 sqq.
Cicero, 144.
Clavius, 80.
Clerke, Miss Agnes M., 82.
Cleveland, Treadwell, Jr., 114.
Coal, 118 sqq.
Comets, 49 sqq.; 58.
Confucius, 106.
Conservation, forest, 112.
Copernicus, 79.
Corolla, the, 96.
Cotton, 111.
Cowper, 87; 98.
Crabbe, 97.
Creation, Genesis on, 36 sqq.
Cunningham, Allan, 108.

D

Darwin, Charles, 22.
Denza, Father, 80.
Descartes, 81.
Design, argument of, 55 sqq.; 103 sqq.
Desmodium, moving plant, 92.
De Vico, Father, S. J., 80.
Distance, 51.
Divine Providence, 150 sqq.
Doddridge, Philip, 133.

E

Earth, the, 55 sqq.; 132.
Earthquakes, 120.
Eclipses, 59 sqq.

F

Faber, Father, 172.
Faith and science, 140 sqq.
Fichte, 30.
Fixed stars, 49.
Floods, 116.
Focas, 13.
Forest conservation, 113 sqq.
Forest pathology, 117.
Furness, William Henry, 33-34.

G

Galileo Galilei, 80.
Galle, Dr., 61.
Gassendi, 80.
Gerbert, Sylvester II., Pope, 78.
Giordano Bruno, 30.
God, existence of proved, 33 sqq.; the Creator of all things, 66 sqq.; bounty towards man, 137 sqq.; benevolence towards His creatures, 158 sqq.
Good, John Mason, 126.
Golden legend, 165.
Grady, Henry, 111.
Gray, Asa, Professor, 93.
Gregory XIII., Pope, 79.
Grimaldi, Father, S. J., 80.

H

Hagen, Father, S. J., 81.
Hale, George E., Dr., 74.
Halley's comet, 58 sqq.
Heaven, joys of, 160 sqq.
Hegel, 30.
Herschel, Sir William, discovery of Uranus, 60.
Hexaëmeron, 39.
Hillis, Newell Dwight, Dr., 25.
Howitt, Mary, 110-111.
Human body, 134 sqq.; 171.
Human mind, 137.
Human soul, 171.
Humboldt, 110.
Hurt, Walter, 17.

I

Ingersoll, Robert G., 23.
Inglis, Sir R. H., 14.

J

Jacoby, Professor, 74.
Jesuits in astronomy, 83.
Jupiter, 48.

K

Kelvin, Lord, 169.
Kircher, Athanasius, 28.
Kirwin, de C., 76.

L

Lacaille, 81.
Lactantius, 159.
Latson, W. R. C., Dr., 136.
Laudate, the, 72.
Leaves of plants, 91 sqq.
Leo XIII., 28; 83.
Le Verrier, 81.
Lichen, the, 127.
Life, 85 sqq.
Lilly, 32.
Linnaeus, 95; 140.
Longfellow, 86.
Lowell, Percival, on the habitability of Mars, 73 sqq.
Lyell, Charles, Sir, 120; 157.

M

Main, on design of the world, 56.
Man, 130 sqq.; the image of his Maker, 133 sqq.; destined for eternal happiness, 140 sqq.
Mars, 48; "canals" of, 73 sqq.; 78.
Materialism, 24 sqq.
Mayer, Father, S. J., 80.
Mercury, 48.
Messier, 81.
Maraldi, 81.
Mariposa Grove, California, 107; 150.
Maunder, E. W., Professor, 74.
Milky way, or galaxy, 53; 78.
Mill, John Stuart, 66.
Mineral kingdom, 33; co-operates with vegetable kingdom, 127 sqq.; 149.
Montgomery, 128.
Moon, 56 sqq.
Mueller of Reensburgh, 78.
Mungo Park, 150.

N

Napoleon, 61.
Nebulae, 50.
Neptune, 52; discovery of the planet, 60 sqq.
Newcomb, Prof. Simon, 52.
Newton, Sir Isaac, 65; 70.
Nicolas of Cusa, Cardinal, 79.

O

Orioli, 80.
Orion, nebula of, 50.

P

Paley, 11; 100.
Pantheism, 29 sqq.
Perry, Father, S. J., 82.
Piazzi, 80.
Picard, Abbe, 80.
Pius X., Pope, 81.
Planets, size of, 44; habitability of, 73 sqq.
Plants, curious, 92 sqq.; preservation of, 98 sqq.; constituent simplicity and great variety of, 107; use and misuse of, 108 sqq.
Plato, 144.
Propagation of plant life, 98 sqq.
Providence of God, 148 sqq.

R

Revelation, Divine, 141; necessary, 142.
Ricci, Father Matthew, S. J., 59.
Rigge, William F., S. J., 82.
Roget, 124.
Ryan, Father, 103; 153.

S

Saturn, 48.
Schaffner, John H., Professor, 103 sqq.
Schelling, 30.
Science, its limitations, 17 sqq.
Science and religion, 83.
Science and revelation, 18 sqq.
Secchi, Father, S. J., 81.
Seed of plants, 89; 98 sqq.
Sewall, Harriet Winslow, 131.
Sirius, 54; 69.
Smith, H., poem by, 93.
Smyth, 169.
Socrates, 144.
Solar space, excursion through, 52 sqq.
Soul, human, 171.
Spinoza, 30.
Stars, number of, 43; size of, 44; distance of, 51.

S—Continued

Stem, the, of plants, 90.
Stillingfleet, 158.
Sun, size of, 45; influence of, 158.

T

Taye, M. Herve, 77.
Theist conception of the world, 33 sqq.
Thompson, J. J., Professor, 83.
Thornton, 96.
Trees, age of, 106 sqq.
Tycho Brahe, 70.
Tyndal, 22.

U

Unity of the physical forces, 65.
Universe, origin of, 34 sqq.; mechanism of, 55 sqq.; harmony of, 56.
Uranus, 60.

V

Vegetable and animal life compared, 125.
Velocity of the celestial bodies, 47 sqq.
Venus, planet, transit of, 58.
Vico de, Father, S. J., 80.
Vogt, Professor, 26.
Volcanic eruptions, 35 sqq.
Voltaire, 145.

W

Walcot, C. D., Professor, 121.
Ward, Nicholas, Father, C. P., 138.
Watson, W. F., Professor, 86.

Y

Young, 15.


O8-CAA-004